

311a





ed, as shown on the progress maps accompanying each report of the Director.

This is being published in sheets of convenient size, 2 by 20 inches. The four-sided area of land represented in an atlas sheet is bounded by parallels and meridians called a *quadrangle*. The quadrangles mapped cover

latitude by 1° of longitude, 30' of latitude by 30' of longitude, 15' of latitude by 15' of longitude, or smaller areas, of the area mapped depending on the scale used. Scales are employed. The smallest scale, that used (quadrangles covering 1°, is 1:250,000, or very nearly 4 miles to an inch—that is, 4 linear miles on the ground is represented by 1 linear inch on the map. This scale is used

of the desert regions and some other parts of the far west. For the greater part of the country, which is mapped in quadrangles covering 30', a larger scale, 1:125,000, or 8 miles to an inch, is employed. A still larger scale, 1:62,500, or about a mile to an inch, is used for quadrangles of 15', the unit selected for mapping thickly settled or very important areas. A fourth scale, 1:31,250, or one-half mile to an inch, is employed for maps that are to be used in connection with irrigation or drainage, and a few maps of districts are published on still larger scales.

Topographic survey of Alaska has been in progress since 1898 and nearly 30 per cent of its entire area has now been mapped. One-third of the area mapped, or 10 per cent of the country, has been covered only by reconnaissance work, the rest of which have been mapped on a scale of about 10 miles to an inch. The maps of nearly all the remaining two-thirds of the surveyed area have been published on a scale of about 4 miles to an inch. These maps are large, presenting 2° of latitude by 4° of longitude. A few



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The shale below the 10" shaly ls bed contains many *Streptelasma*, (cup corals), also *R. spiniferoides*, and *S. pennatus* and *T. crinatus*. The 10" band also has the *Streptelasma* but is very shaly and poorly defined, however, the bed with *M. subulatus* will serve to orient.

Lichenon  
1 1/2 miles SE of E.B

In roadcut consists of a lower layer of hard grey ls of about ~~16~~ 16" thickness, then 1 1/2' of shale a dinged with ls and crinoid fragments, then 5" hard grey ls. succeeded by shale.

In the 1 1/2' layer of sh. *D. lineatus*, *Lichenalia*, *Pteronotus*, *cf. undosus*, *D. set sculptilis*, <sup>big cup corals</sup> *Bryozoa* were found.

In the 5" ls. band were seen *P. rana*.

The lowest layer bears the most crinoidal material there.



## East Bethany

July 31

Tichenor (Roadside) 1 1/2 mi SE of EB

Lowest rock exposed is 17" - massive bed of crinoidal limestone containing many corals and much crinoidal debris

*H. belli**D. lineatum**Crinoidophyllum**A. macranta*

Top 6" is shaly and in places non-crinoidal  
Contains also silicified fossils

Above the lower massive bed is 13" of shale containing many bryozoans and corals  
This contains also nodular masses of crinoidal ls.

*P. pavilionensis*

The shale is succeeded by a 6" bed of limestone in which the fossils are silicified. This bed is followed by about 4' of blue grey shale forming the top of the exposure. The uppermost limestone layer is extremely hard, brittle, and gray texture.

*P. crassa**R. varianensis*

I refer this layer to the Menteth equivalent and the shale above the Menteth were seen:

*S. pennatus**N. concinna**R. penelope?**C. coronatus*



Fauna seen in Dickerson as a whole:-

<i>V. pustulosa</i>	<i>R. vanuxemi</i>
<i>C. indenta</i>	<i>N. concinna</i>
<i>J. carinata</i>	<i>A. spiciferoides</i>
<i>A. decorata</i>	<i>D. sculptilis</i>
<i>P. sand</i>	<i>Platyceras</i> sp.
<i>D. lineatum</i>	<i>P. ptilonotus</i>

### White Cocks (Windom) Resection

Concretionary bed at base abounds in small black concretions and in *A. umbonata*. About 65 paces from the point where the concretions were first observed (1768 paces?) they are in the stream bed. The rock is mostly covered for the first 5' above the concretionary bed. At the top of the 5' interval the following fossils were seen.

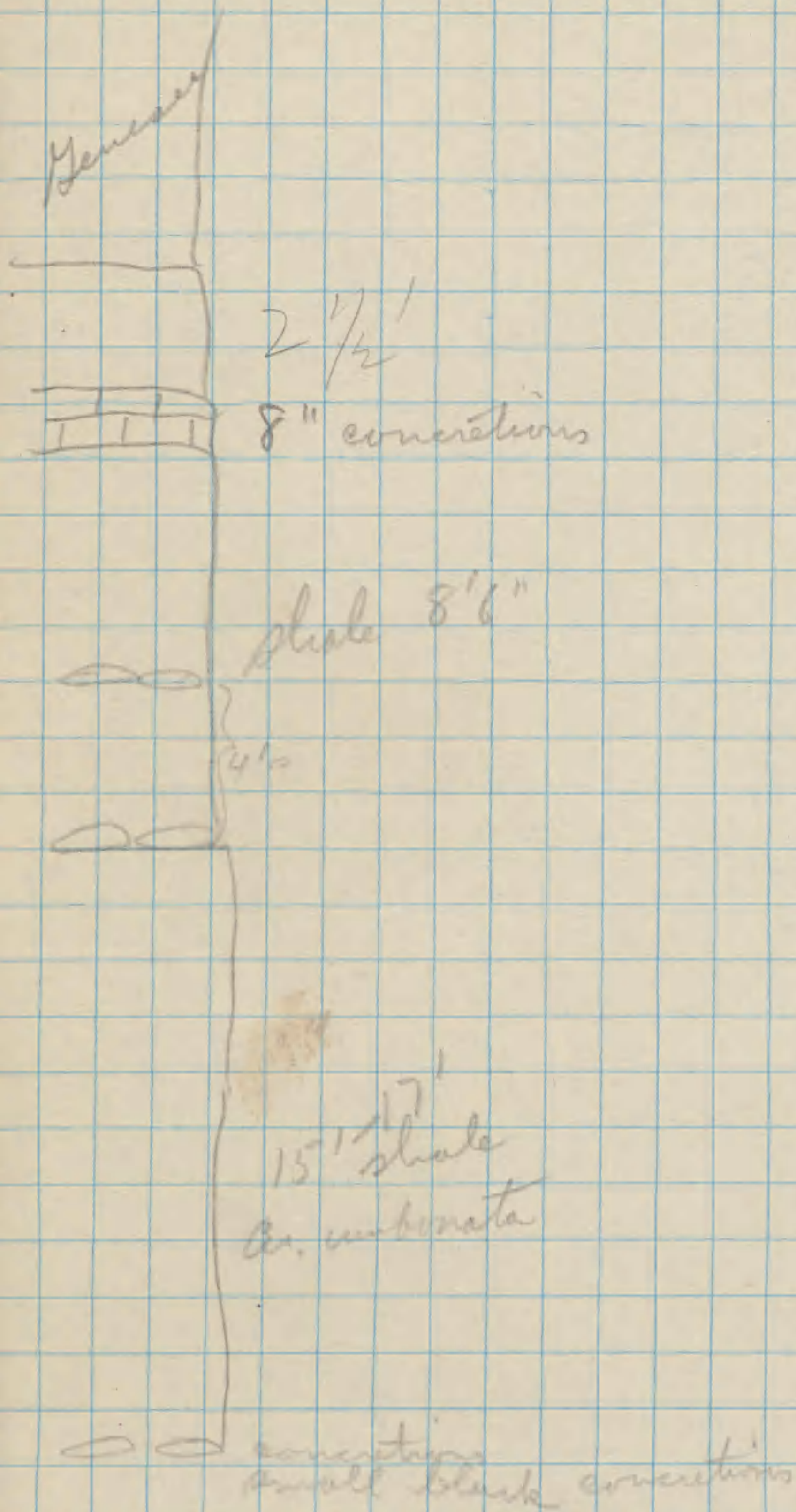
<i>S. gemma</i> n	<i>A. umbonata</i> cc
<i>Pholidops</i> n	<i>C. setiger</i> c
<i>L. papposa</i> n	<i>C. umbonata</i> c
<i>C. bellina</i> n	This fauna is for about 1' shale
<i>L. pennatus</i> n	

The total thickness of the Windom is about 30. From the *Amboecella* beds to the top of the calcareous bed with *Strophomena* is about 27' by hand-level. Measured from bed to bed however the thickness appears to be about 36'. In 7' below the first layer of concretions above base occur:

*A. umbonata* c  
*P. sand*  
*Pholidops*  
*L. pennatus*  
*C. bellistriata*  
*A. spiciferoides*



# Windom section





Shale between two upper concretionary beds contains:

<i>C. coronatus</i>	<i>A. spiniferoides</i>
<i>A. reticularis</i>	
<i>A. layer of concretions 4' above the Ambocetus beds yielded:</i>	

*L. gyphina*

*L. gymna*

*R. reticularis*

*C. bellistriata*

*C. scitulus*

*A. andacula*

*C. mucronatus*

*Micostella*

*S. margini(?)*

*C. coronatus*

*A. spiniferoides*

Does the 8" concretionary layer occur: -

*A. reticularis*

*S. rectum*

*C. boothi*

*L. gymna*

*R. vanuxemi*

A pyrite lens on this creek is nearly a foot thick.

Fauna in uppermost 2 1/2'

*A. reticularis* c

*R. vanuxemi* cc

*A. andacula* cc

*A. spiniferoides*

Criboid stems

*S. inaequantata*

*C. mucronatus* c

*S. granulosa*

*C. bellistriata*

The fossils in the Window are mostly restricted to small patches in more or less barren shale. They are not scattered thru the rock as is the case with the Kashong shale. The fossils are also frequently localized in concretions.



Locum's locality on White Creek  
between the E. Bolling Provision Road & the  
D.R. & W.R.R.

At 1300 paces from Ledyard exposures  
paces down stream, Pleurodictum bed is  
exposed, collecting is good, the conspicuous  
trilobite bed is about 8' above stream level  
& has same character as at R.R. cut.

At 1533 paces from Ledyard exp. the following  
fossils were seen in the upper 2' of  
the Pleurodictum bed:

<i>S. pennatus</i> c	<i>P. punctilifera</i>	<i>A. spiniferoides</i> c
<i>S. section</i> c	<i>Pygospio</i>	<i>A. subornata</i> c
<i>S. ungula</i> c	<i>C. botti</i>	<i>C. scintillus</i> c
<i>C. viduus</i> c	<i>P. iowensis</i> c	<i>R. vancouveri</i> c
<i>A. decussata</i> c		<i>A. macronota</i> c
<i>S. angulatus</i> c		<i>A. audacula</i> c
<i>P. carinatus</i> c		<i>M. corvina</i> c

In the lower Trilobite bed are:

<i>S. section</i>	<i>A. subornata</i> c
<i>P. carinatus</i> c	<i>S. pennatus</i>
<i>S. angulatus</i>	<i>P. punctilifera</i>
The lower bed is 6".	<i>M. pygmaea</i>
<i>D. lineatum</i>	<i>P. houseila</i> sp.
<i>M. subalata</i>	<i>D. inaequistriata</i>
<i>C. botti</i>	<i>S. muricium</i>
<i>P. foliolium</i>	<i>M. subalata</i>
<i>B. leda</i>	

Between upper and lower Trilobite beds  
is 15" shale:

*A. spiniferoides*  
*A. subornata* c



$$\begin{array}{r}
 1533 \\
 750 \\
 \hline
 2283 \\
 4506 \\
 \hline
 5711 \\
 5137
 \end{array}$$



of the upper bed (B<sup>u</sup>) were seen:—

*M. subulata* c. *S. fissicula*

*S. pennatus*

This bed is unusually hard and resistant here.

Above the upper Diab. bed is soft sh. in places rather fissile. The shell of the Pleuro. bed is more solid and does not break into such very small chips. It has a purplish color.

*C. ~~subulata~~ setigerus*

*A. umbonata* c.

*S. pennatus*

Ostracods

149 paces upstream from the last exposure is a calcareous layer in the stream bed.

This layer contains *M. subulata*, *C. boothi*.

*S. pennatus* etc. It is either bed 'M' or the upper Diab. bed brought upstream.

Ledge exposed one mile downstream.

Pleuro. bed. About 750 paces total 2283 paces.

The Pleuro. beds have not as many corals here as on Murder Creek. The upper 2 1/2' are devoid of corals except for the small *Streptelasma*. *S. granulosa* is rare in this bed this far east as is also *R. penelope*.



July 28

1978

## East Bethany

At the first bridge over the Tachawanna west of E. Bethany station, Locum's B4, the *Crinoid* occurs about 5' above the level of the tracks, about 1015-1020'. Above is the complete thickness in nowhere shown. The exposure consists of loose blocks in the banks along the side of the RR. Locum named this limestone the "Locum". The exposure is not exceptionally good either for collecting or examination. The ls. is dark grey in section but weathers to a rich yellow brown. It is a somewhat shaly limestone. A piece of fossil was collected. In other places the rock is a shaly shale, fossils are most abundant in the shale.

Locum's E from second RR crossing the Crinoid field occurs in the bed of a small stream at about 975' above sea-level. Along the banks and bed of the stream is about 1' of soft bluish shale bounding in corals. This is capped by 1' of limestone in two layers. The lower layer is hard bluish grey ls. with some crinoid debris. It is 4" thick and contains *P. corvallis*. The upper layer is 7-8" thick of blue grey crinoidal ls. These two layers dip strongly to the west. Many of the fossils are collected and protrude from the rock which weathers to a light yellow brown.

About 3' below the heavy massive layer of limestone there is weathered shale without any fossils in it. Upstream about 250 yards from the crossing of this stream and the bridge the



$$\begin{array}{r} 15 \\ 18 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 45 \\ 45 \\ \hline 90 \end{array}$$



Blueschists with *L. lancea* and *Astracods* is in full force, this is at approximately the bend in the RR track. It was not possible to see or measure the complete thickness of the Centerfield.

From the top of the *L. lancea* band of the Centerfield to the *Phanerostoma* bed (?)

No. 2 collecting ground is located at RR curve. Blueschists is in stream about 100 yds east of the curve.

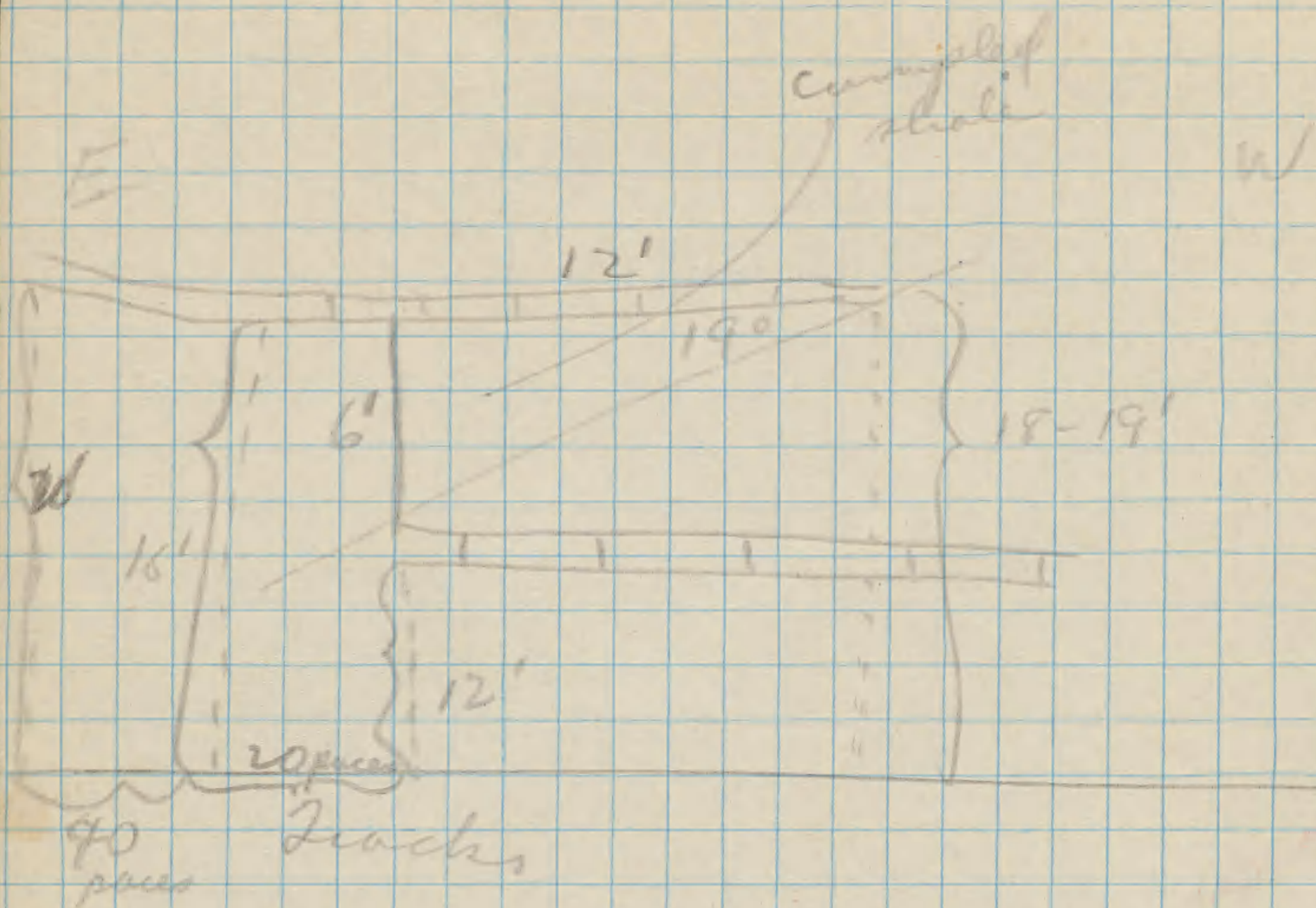
440 paces west of centerfield exp. (460 paces E of bridge) is about 53'. This is measured from the Centerfield fence is faulted. At 460 paces from bridge *Phanerostoma* bed is 20' above the RR tracks.

400 paces from RR bridge *Phanerostoma* bed is faulted. Downthrow side of fault is on west side is 12' above the tracks. Upthrow side is on east about 18' above tracks. The throw is then about 6'. The *Phanerostoma* bed makes a shallow trough on the east being at 460 paces 20' above the tracks, at 440 16' above the tracks, the dip is reversed at the fault being 18' above the tracks.

The ~~*Phanerostoma*~~ fault plane dips E. The *Phanerostoma* bed dips approximately 1° W about 25 paces west of the fault. 332 paces from bridge it is dipping 2½° by compass. It is 6' above the tracks at 332 having dipped 6' in 68 paces or 204' per mile.

From 332 paces to 132 paces from the bridge microch is exposed. At 132







The *Strophalosia* bed can be seen 121 feet above the tracks, it is a ~~concretion~~ layer of concretions about 6" thick. Above it comes about 8' of shale, referred here to the *Pleurodictylum* bed. At 32 paces from the bridge the *Strophalosia* bed is about at the level of the tracks. Fossils in concretions referred to *Strophalosia* bed: -

Small <i>Ambocoelia</i> c	<i>S. pennatus</i>
<i>P. nana</i>	<i>E. itys</i>
	<i>S. trichocata</i>

Dip on upper ~~lower~~ <sup>upper</sup> Trilobite bed east of bridge is 10° on S side track, 20° on N side at bridge. Fossils seen on slope washed from *Pleurodictylum* bed are:

<i>S. rectum</i> a	<i>A. macronota</i>
<i>A. spiniferoides</i>	<i>A. umbonata</i>
<i>Favosites</i> sp.	<i>S. pennatus</i>
<i>P. styloporum</i>	<i>S. ungula</i>
<i>R. rhynchonella</i>	<i>R. pediculus</i>

The upper Trilobite bed (probably concretionary bed) is hard and resistant here, a shaly limestone especially characterized by abundance of *M. subulata* and *B. lida*. It is 4-5" thick. On the east side of the bridge is a good exposure of the lower upper 4' of the *Pleurodictylum* bed. Here were seen: *C. scitulus*, *A. umbonata*, *R. frimbriata*, *S. granulosa*.



upper  
~~lower~~ Trilobite bed is 1' thick and  
 contains:

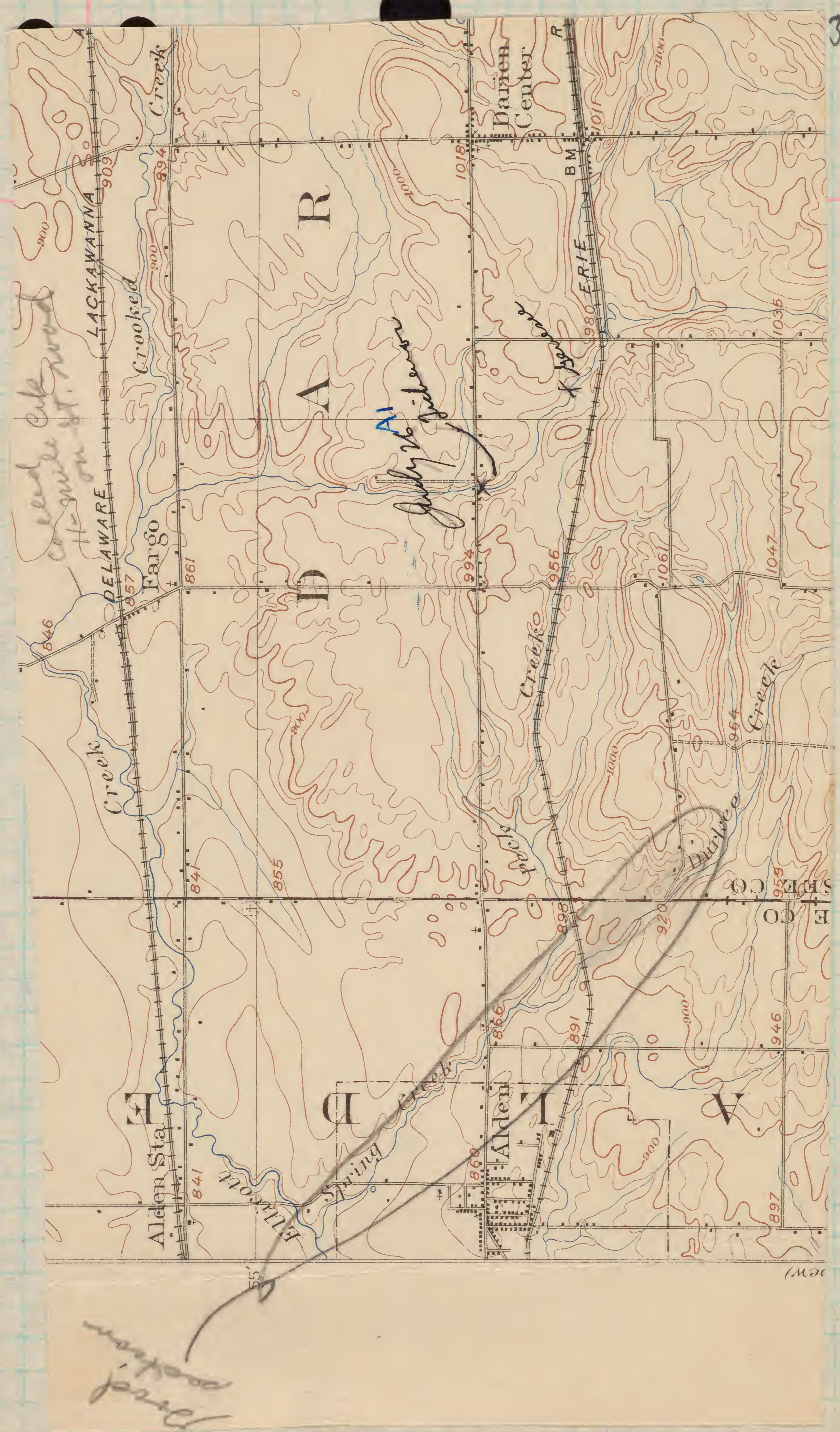
*S. fissurella* c  
*M. subulata* c

*B. leda* c

The lower trilobite bed is poorly defined  
 but consists of about 54-64' of  
 calcareous sh. separated from the  
 concretionary bed by 1 1/2' of shale this  
 then gives a thickness of about 6 1/2' to  
 the *Pleurodictyum* bed  
 In the lower bed: occur  
*S. rectum*

In the 19" sh. *S. parvum* & *S. spinifrons*  
 The Trilobite beds go underground 50 paces  
 west of the bridge.





323a

road

DEW





111



## Ellicott Creek

## Tichenor

1. Lowest bed has large Favosite heads at the contact with the shale next above. The shale abounds in corals & bryozoa - *Craspedophylloids*, & *E. jania*, *Pidaria*.

The Tichenor is 50 paces from the road. The shale is followed by 11" of heavy ls. and this by 9" of heavy grey ls. which becomes shaly at the top. These two ls beds are followed by 4" of shaly <sup>ls</sup> *ana* this by 8" of ls. grey and brown crinoidal. This layer is correlated with the non-crinoidal layer at the top of the Tichenor on Murder Creek.

## Moscow

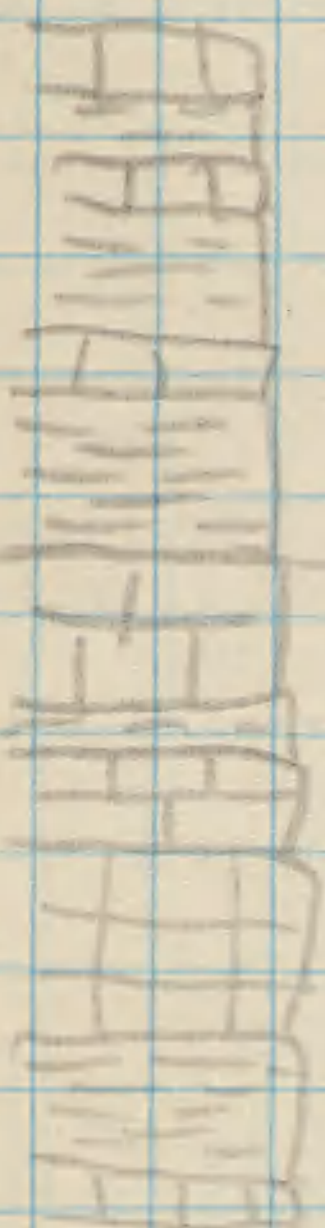
Above the Menteth (?) comes about 19" shale. This shale is mostly unfossiliferous but has many ls lenses in it with fossils.

*A. macronota*  
*C. incusata*  
*M. concentric*  
*P. ana*

*P. marginata*  
*I. exigua*  
*A. decussata*



# Fisham



ls  $2\frac{1}{2}$  - 10"

sh  $1\frac{1}{2}$ "

1' shale  
2" impure ls.

19" shale

8" ls gray, non-cinoidal

Waco  
mantle

4" shaly ls.

ls. 9"

11" heavy ls.

15" shale, many corals

6" ls. impure, non-cinoidal 1.



This is followed by 2" impure ls. with

~~M. confinis~~  
~~L. papilion~~  
~~C. cornutus~~

Then 1' shale, ls 1 1/2', shale 3" <sup>10"</sup> ls. 2".  
The second ls. bed is in the stream 100 paces upstream.

The following fossils were seen in this 40 inches of shale and ls. are:-

<i>D. lineatum</i>	<i>S. junia</i>	<i>P. rudens</i>
<i>P. rovi</i>		<i>P. rana</i>
<i>Platystrogon</i> sp.		<i>L. papilion</i>
<i>M. confinis</i>		<i>C. cornutus</i>
<i>A. decussata</i>		<i>C. spiniferoides</i>
<i>S. subtilis</i>		<i>T. limbata</i>
<i>S. pennatus</i>		<i>H. dehayi</i>
<i>C. pinnatus</i>		<i>A. macronota</i>

About 11 feet above the limestone at 100 paces is a layer of impure ls. about 3" thick and about 5' of sh. above this. The upper ls. bed is at 120 paces upstream the 3" shale bed is 16" thick, and the upper ls. layer is in the stream at. The upper ls. bed is on the stream at 120 paces above the Westgate.

128-161 - covered

161 - 190 - bluish shale with masses of crinoid debris and *T. limbata* and bryozoa

190-240 - covered

240-266 - blue slab at stream-level

266-285 - covered

285-466

Bluish grey shale - *S. pennatus*,  
*T. eninatus*, *P. styloporum*



From 300 - 348 there is about 10' of shale in bank. Fossils here are -  
*T. cinnatus*, *M. cinnatus*, *S. pinnatus*,  
*C. spiniferoides*, *P. rana*, *P. stylopsum*,  
*P. rana*, *T. bellulus*, *L. peltata*, *A. andacula*,  
*H. clausi*  
 At 466 a concretional layer is in the stream-bed. It contains *M. cinnatus* in rather large numbers.

466 - 584

*C. bellulata*, *A. erectum*, *Ammonoidea* sp.

584 - 710 - covered.

710 - 979 - mostly covered.

979 - 1074 - breaks into very thin fragments. at 1146 a few *Ammonoidea* were seen in the stream-bed.

1200 a layer of concretions are in the stream-bed. *C. coronatus*, *C. scitulus*, *A. andacula*.

This shale becomes lumpy when water leached, the hammer striking into it like a mass of mud, but where it is sun-baked it splits into small, thin fragments.

1336 - 1374 - abounds in concretions. *P. rana*, *C. boothi* were seen, also *A. reticularis*. There is here about 4' above stream a poorly defined calcareous layer about 1' P. range. These layers are in the stream at 1666 paces.

At 1765 paces comes the contact with the Genesee.



Fossils in the 2' below the contact are:

*C. mucronatus* *A. Andacula*

*Pholidops lamm* *A. reticularis*

There is a foot of Hamilton below the Genesee then a layer of concretions,

On the foot of shale between the concretions & the Genesee were seen -  
*R. vanuxemi* *Strophomena*, *C. mucronatus*  
*P. rana*

Below the concretions are

*Pholidops lamm* *A. andacula*

*C. mucronatus* *A. reticularis*

*S. pennatus* *P. rana*

Pyrite is very abundant in the rocks here

Check back

From Genesee to 2' concretionary bed is 125 paces.

125 - 204 - calcareous bed. This layer is fully 2 1/2' thick consisting largely of calcareous shale with many pieces of calcareous masses. *P. rana* is the most abundant fossils. *C. boothi* is present, and *A. subcostata* occurs sparingly. Pyrite concretions are also very plentiful.

At 343 a small *Strophomena* was found loose. It may be that these calcareous layers represent the *Strophomena* band, the great abundance of *P. rana* suggests this.

400 - 417 - Blue shale -

*C. coronatus* *A. reticularis*

*C. scitulus* *C. mucronatus*

Small corals *S. pennatus*

*Schuchertella cheimung* *Cyrtina lamm*



These were found about 7' below the  
 surface as layers abounding in  
 Placoids. At 417 is a layer of  
 Concretions. Exposures of shale continue  
 to 567 paces.  
 577 - 641 - covered. At 641 a patch  
 of Ambocoelia was seen in the  
 shale at stream-level. With the Ombos  
 are *C. mucronatus*, *E. parvatus*.

### Fauna in the Menteth -

*A. spiriferoides*  
*P. hania*

*A. andaula*  
*A. granulosa*

Elliot Creek was visited in an effort to work  
 out the zones in the upper part of the  
 Moscow, but they could not be any more  
 satisfactorily determined than those on Bowen  
 Brook. The Kashona shale seems clear enough  
 but only one small patch of *Ambocoelia*  
 rewarded the search for this fossil. The  
 Window shale seems to be very thin and a  
 layer of limestone suspiciously like the  
*Strophomena* bed occurs not more than  
 5 or 6 feet below the base of the Seneca.  
 The base of the Moscow has thin  
 fossiliferous layers of limestone with a  
 fauna that is of no value from the  
 Old Fichron, with which the Moscow  
 appears to finger. The *A. praecambona* beds  
 were not seen either at Elliot Creek or  
 Murder Creek or Bowen Brook. Perhaps  
 northward these beds have ~~been~~  
 thinned out. Certainly they are in full  
 force on Cayuga Creek!



The Ambocoelia zone is close to the top of Tichenor in the exposures at Bull's Bridge and Cagenovia Creek but at Darien it is way above it suggesting northward overlap on my Rensselaer shale.

Pictures today

- 2 of pyrite Bowen Creek
- 1 Rensselaer shale Elliott Creek
- 1 Tichenor Elliott Creek
- Trilobite bed Murder Creek
- Menteth 2 Murder Creek



One of the concretions in the band just under the Genundewah ls. contained a *Leiorhynchus*. *S. tellus* was not seen in these upper shales.

Where the Moscow shales are exposed in the banks they fall into small chips, but in the stream beds they preserve a sort of concretionary structure.

The Genundewah ls. 560 paces from top of Tichenor in stream bed!

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Section on the shore between Clover Banks and Avery's ravine

Above the *Strophalosia* bed were

3' of fissile shales soft and crumbling easily.

3' Ludlowville

6" *Strophalosia* bed.

In the clay and broken fragments 13' above

12' 10"

*Strophalosia* bed 2 spec.

of *P. stylipora* were found and *S. pennatus*. These were not in place but still are not far from their origin

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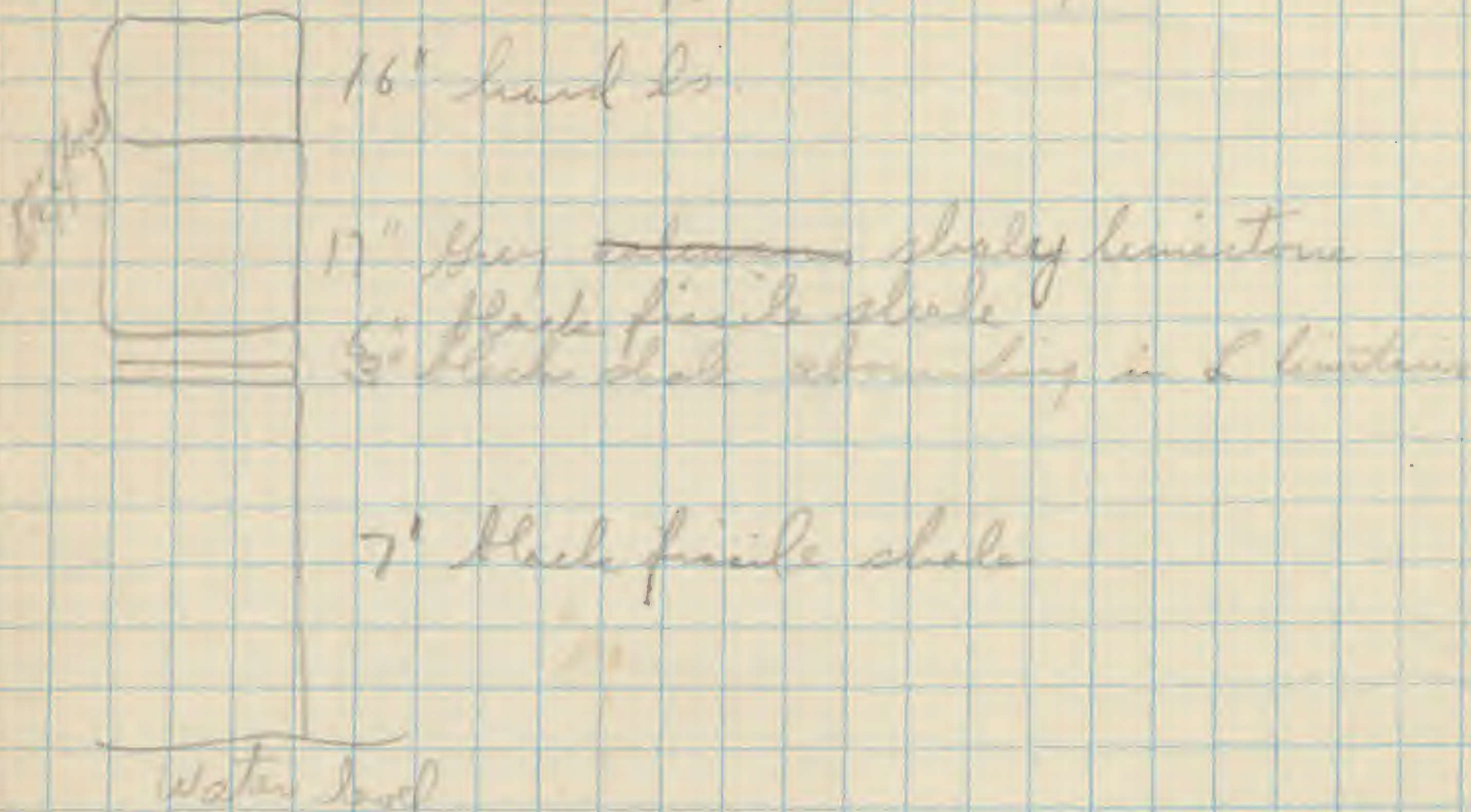


## Note on Avery's Creek.

According to Graham the *Pleurodictyum* beds are exposed on Avery's Creek but at their level is now a pond. This section must have been dammed in both places quite recently, thus caving up the *Pleurodictyum* beds. The upper Ludlowville beds were not carefully examined as they were scattered up the stream & their exact position was difficult to determine.



# Cliff at Lacey







1000



The fauna about 35' below the contact with the ~~Bennesses~~ and above a stratum of ls about 35' below the contact contains *S. andaculus*, *Streptelasma*, *R. vanuxemi*, *A. reticularis*,

6 steps from top of 6" band to contact.

7' above the 6" calcareous shale comes a band of shale that bears many corals, *Heliophyllum*, *Cystiphyllum*, *Endophyllum* etc., *Chumpy* *Favosites*. It is a shale mixed with ls.

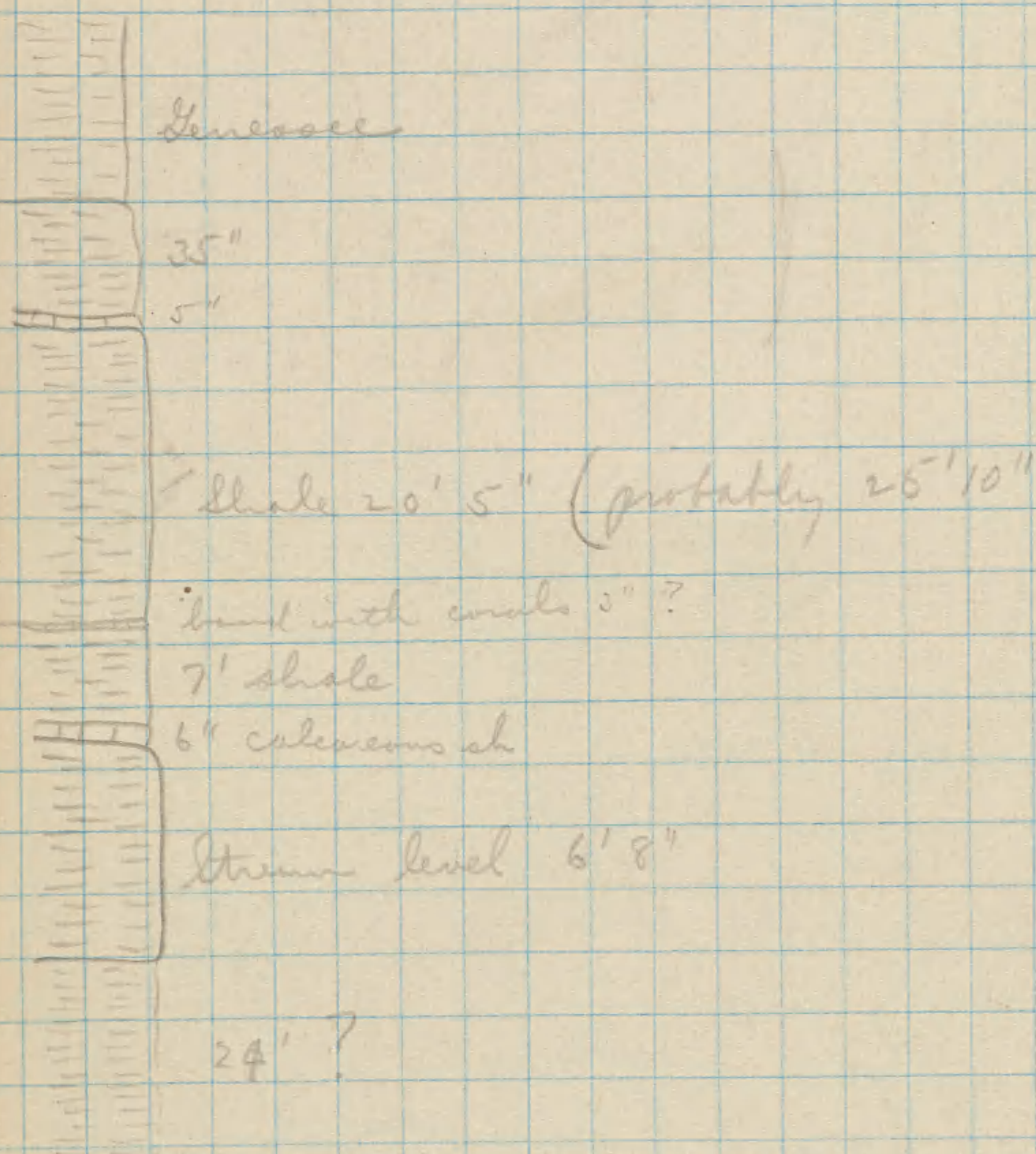
20' 5" from the top of the six inch band of ls. is another about 4" thick.

At 1442 paces in stream bed the rock is hard and calcareous & have *Chaetetes* sp. and *O. undulata*. On these are softer shales. These hard beds also have huge *Phacops rana*, *H. deKayi*, *S. permatus*, *Homonius*.

At 1490 paces *Chaetetes* is very abundant forming small reefs of branching forms. Here also were seen *S. caninatus*, *Cystodictya*, *S. permatus*, *Camartocchia*, *Platyceras*, *C. beuthi*, *A. spiriferoides*, *P. rana*, *C. coronatus*, *S. bellulus*, *Terebratulids*, *Favosites*, *D. sculptilis*,



Section at 950 paces.



245  
 84  
 3 29  
 33  
 364  
 5  
 372

360  
 30  
 390

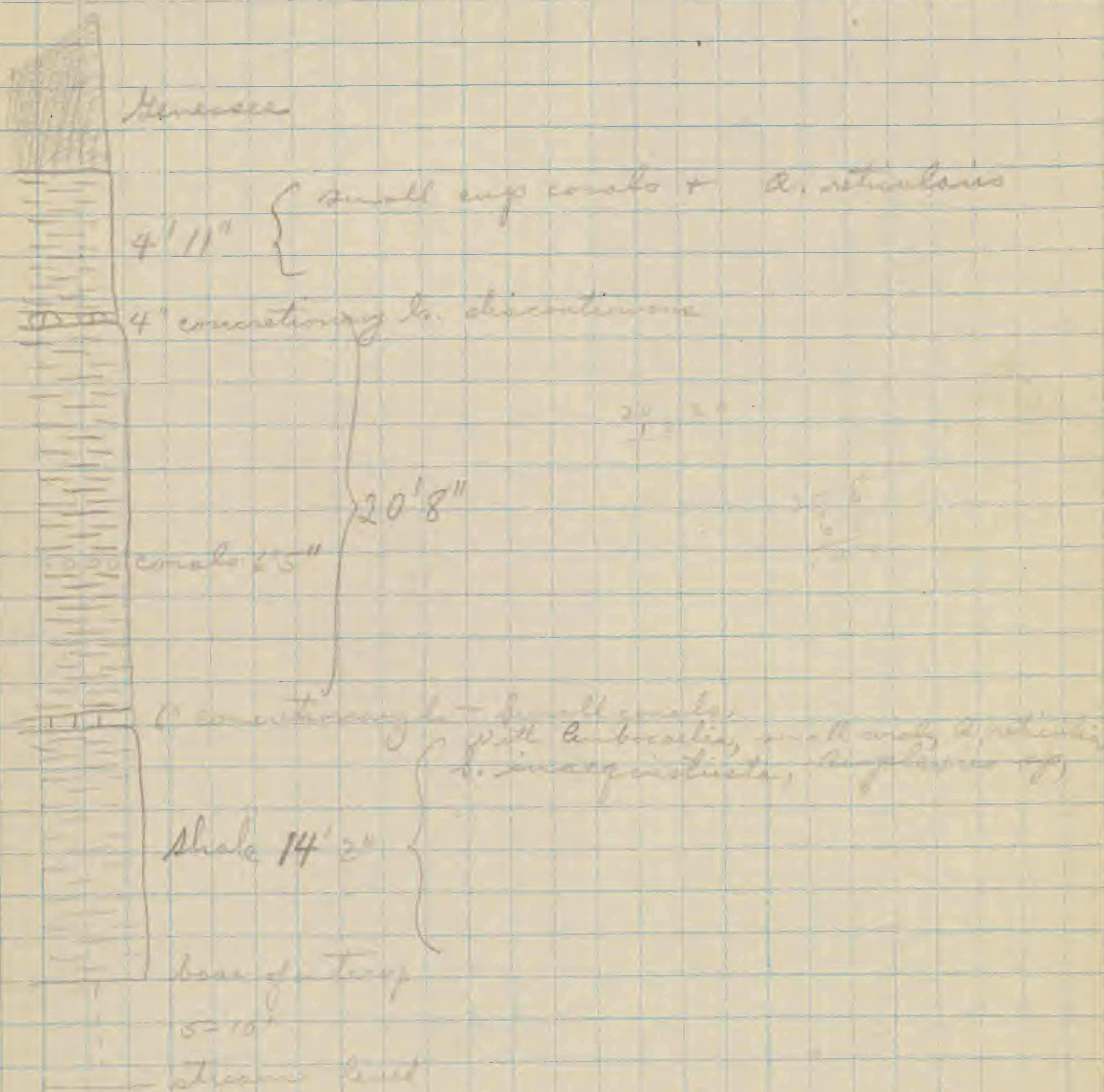
The fossils at 1490 paces are in general localized to the harder masses carrying the Chaetetes. This horizon is right at the intersection of the two streams at b.

147 paces upstream from intersection b was found *S. solenoides*.

832 paces upstream from b the following fauna was found *P. rana*, *S. pennatus*, *Limbocelesia* sp., *E. scitulus*?



Section 555 paces S of road



Section 555 paces south.

On the 1st 5' 5" of shale on the 6' band of ls. are found corals (small) large *Spirifer*.

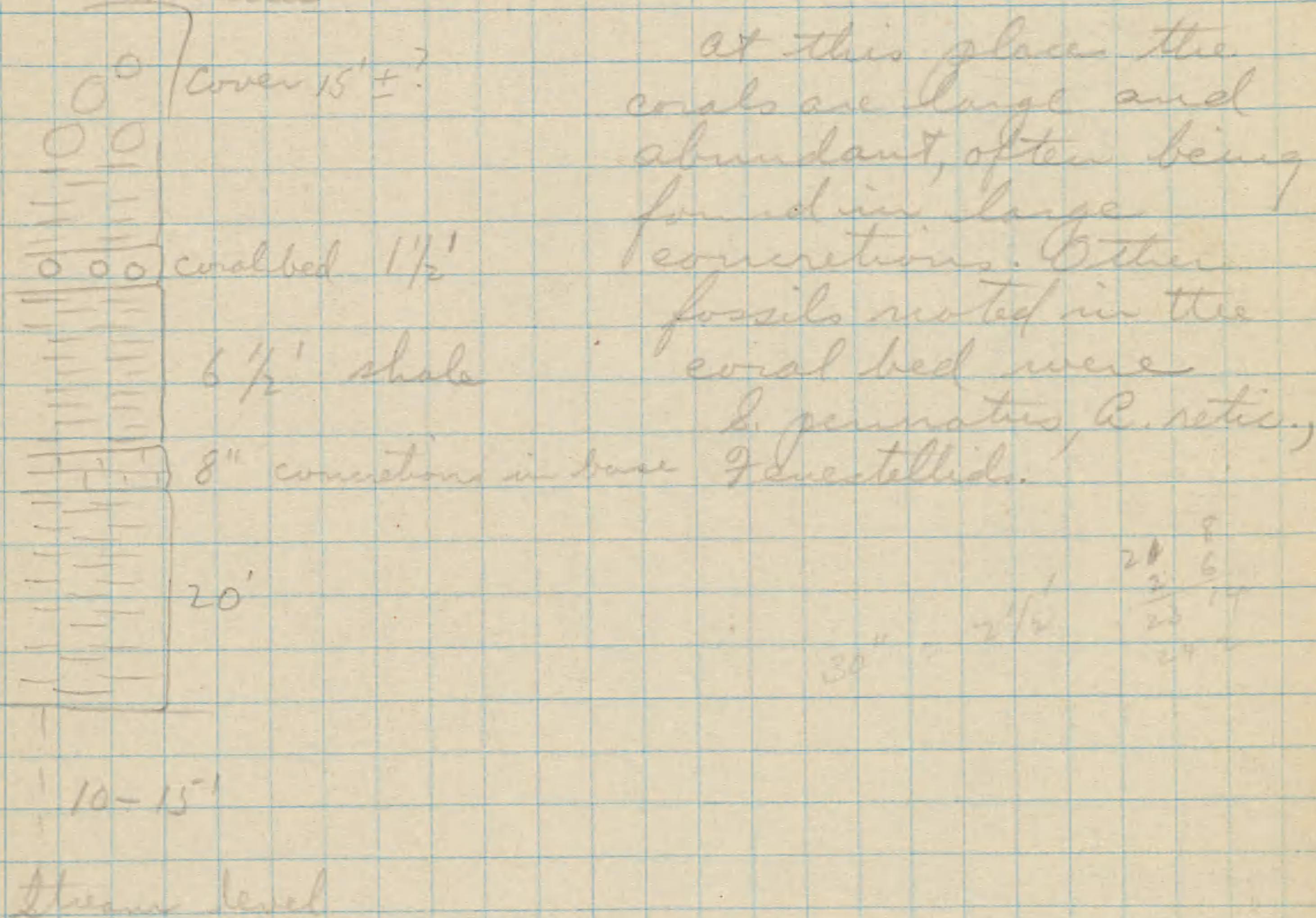
About 6' 5" above the ls (6") comes a band of corals with *Heliophyllum*, *Cyrtophyllum*, and small *Favosites*.

At 20' 8" above the lower band of ls. comes a concretionary band of ls. that is here quite discontinuous. In the 20' interval small cup corals are prominent. In the upper 4' 11" of shale pyrite concretions occur.



It seems a rule that pyrite concretions are most abundant in the upper 10' feet (arbitrary) or so of Moscow. The discrepancy between this section and that 200 paces to the north is probably due to cover.

Section 677 paces south from road



At 450 paces ~~above~~ south of road level in section on page 1 of July 28<sup>th</sup>'s notes the coral bed occurs ~~at~~ 24' 2" above the top of the 6" calcareous bed with *C. whickonatus*. The concretionary ls here below the corals is not prominent as it is exposed only in a joint face.

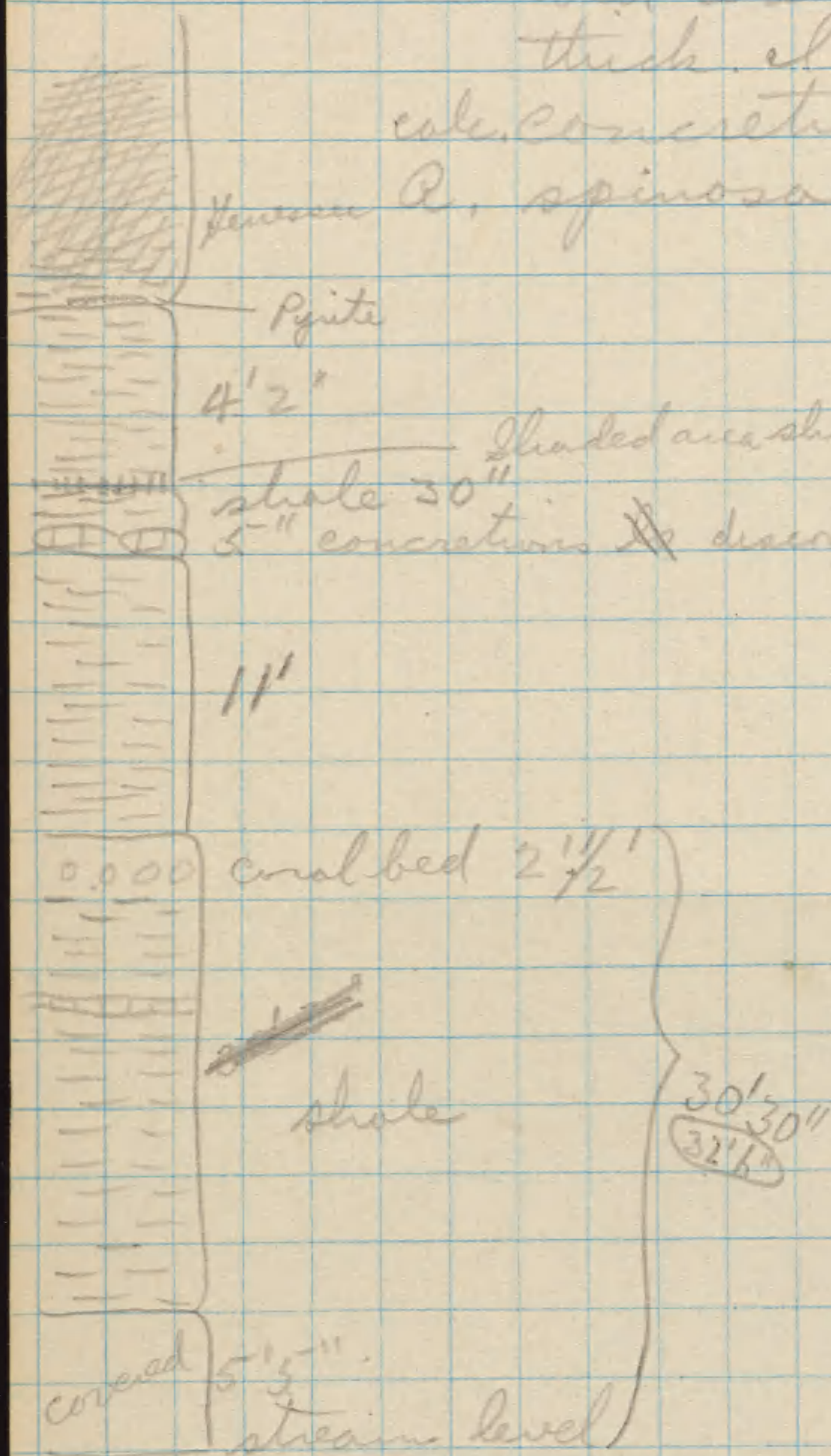
The coral bed and limestone below are well exposed at Fall Brook.



Section 250 paces south of road

Between 3rd & 4th steps were found small corals & *A. retic.*

Just below the 6th step the coral bed was met and it is about  $2\frac{1}{2}'$  thick. It has large flattish, oval calc. concretions with corals, also *A. spinosa*, bryozoa, *A. spiriferoides*.



Shaded area shows probable position of lg. band although it cannot be seen.

The ls. bands cannot be distinguished here as they are too disintegrated. They are probably not good horizon markers. A small, thin pyrite lens ( $\frac{1}{2}$ " thick) was found here.

About 24' up occurs a hard calcareous band

At 450 paces in the debris a *Pleurodictyum* was found. This one, and the others in the Moscow do not look like the Ludlowville *Pleurodictyums*.

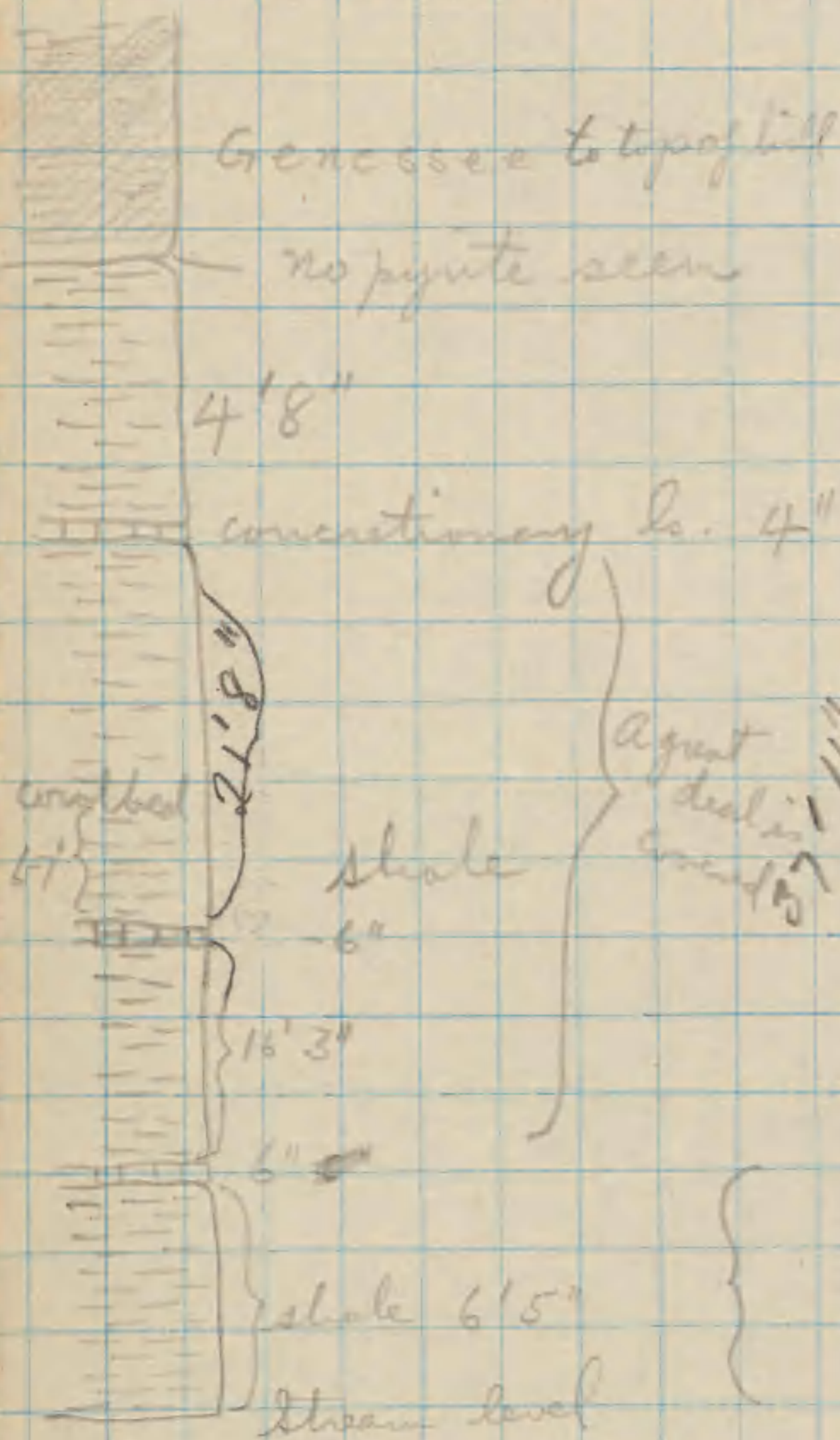
The beds above at the stream intersection (upper) with *Chaetetes*, *Homalotus*, etc. belong to beds considerably lower than the Coral horizon.



July 28<sup>th</sup>

## Little Beard's Creek

450 paces south of short road, or about  
1000 paces north (at intersection of streams  
Between 2 + 3 steps above the  
6" ls band in the debris  
(probably not far from place)  
were found small corals  
(*Strophotranos*, *Amplexus*), *A.*  
*reticularis* and *P. variegata*  
Above the 4" band (upper)



of concretionary ls were  
found only a few small  
corals and *A. reticularis*.

The lower 6" ls is hard,  
impure and contains  
ostracodes, *C. mucronatus*,  
*Amplexus* sp, *C. scitulus*  
and *C. lepidus*?

555 paces south of said  
road in woods is a large  
exposure of Moscow shale.  
Here the shales below the  
6" ls band are well shown.  
The bottom of this exposure  
is fully 5-10' above  
stream level. It is hard  
leveled from the base of  
the exposure as the woods  
prevent any such procedure  
from the stream level.

37 1/2  
15 9/16  
21 8/16  
56 1/2

37 1/2  
21 8/16  
58 1/2



450

454a

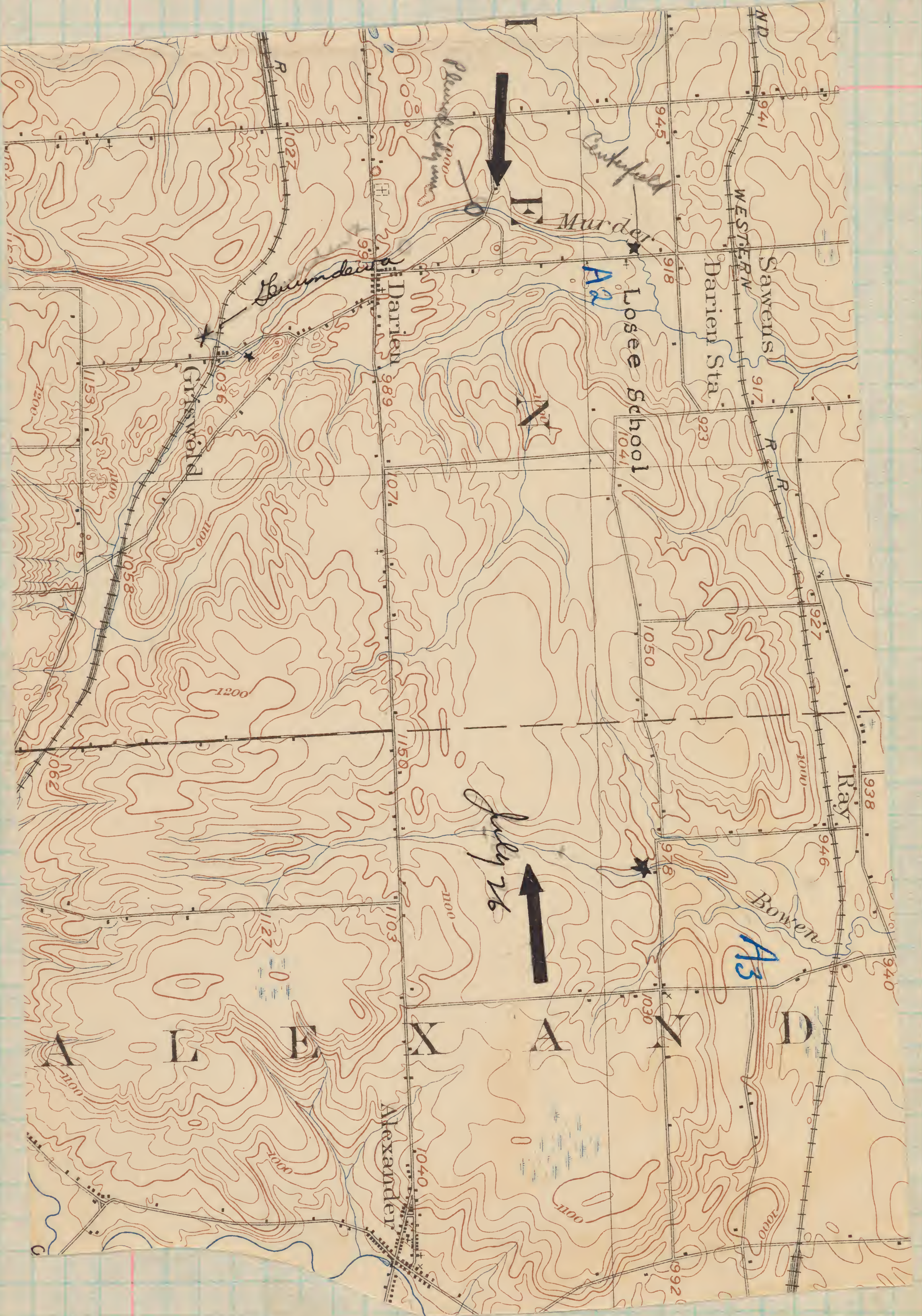
~~450~~

July 27.

Just outside (west) of pavilion the contact of the Genesee & Moscow occurs about on the 980' contour. Here occurs a course of concretions about 20" below the contact. *R. reticularis* occurs below the concretions, *R. cyclas*, *S. pennatus* above, but the shales above the concretions are not very fossiliferous.



4546





1927

July 21

## Murder Creek

On stream opposite schoolhouse  
(Loser) a series of ls. and shales bearing  
abundant fossils. At the stream bed is  
a 4" layer of hard limestone with  
*S. denissa* *R. fimbriata* (horizon?)

*S. spiniferoides**Helicoplutea* sp.

Below this is ls. but the thickness  
is indeterminate. These have *Lichmanella*,  
*P. nana*, *Camarotoechia*, *Camarocrinites*,  
*S. conchata*, nodular bryozoa, etc. This  
probably belongs to the lowest ls. at

Blossom. The next bed about  
4" ls. as noted before  
has the following fossils

*Favosites* lam.*P. imensis**C. brachyura* var. *collatella**Camarotoechia* sp.*Cyrtina hamiltonensis**A. reticulata* (small)*A. decussata**Cryptonella*?3' ls. with *S. pinnatus*

Shale 7"?

4" with *S. denissa*

?

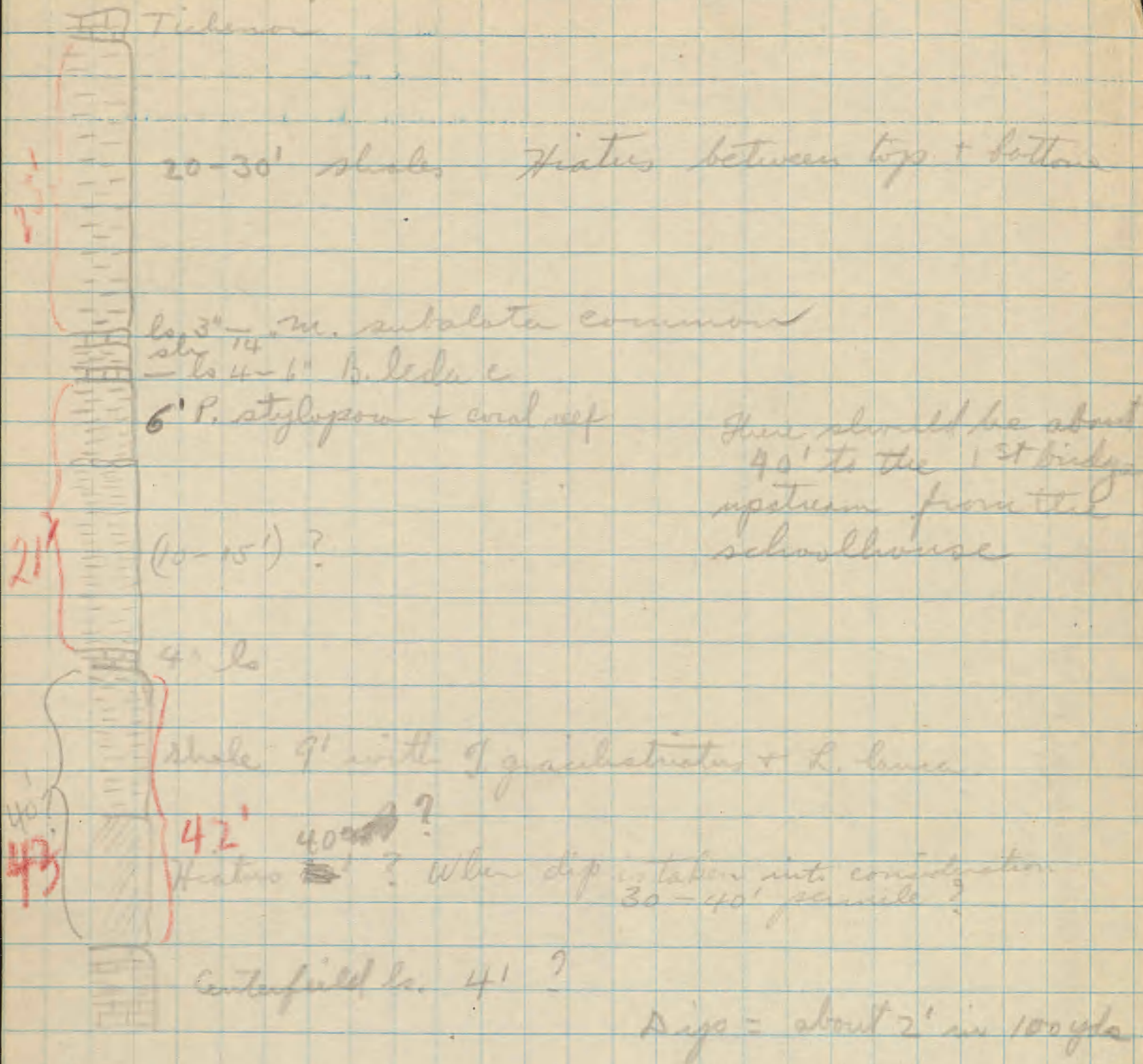
Then follows an indeterminate  
thickness of shale from which the  
fossils mentioned above & can be found  
in the dirt. The shale is about 7"

Then there is a 3' layer of ls. with  
*S. pinnatus*

At a little higher stream 1/2 mile  
south of the schoolhouse on the  
east bank of the creek are 8-9' of  
shales rich crowded with *Tentaculites*,  
*Cratichneumon*, *P. fimbriata*. Other  
fossils noted here are *P. ligula*  
rare *P. nana*, *P. imensis*, *P. nana*



# Ludlowville Mound Crk.



When figuring this section from the hiatuses must be distributed between the *Phanerostoma* bed and that between the T and the *M. subulata* bed. It will be noted that about 30-40' intervened between the *Phanerostoma* bed and the Creek bottom at Ebenezer. The Centerfield could therefore just have been far off.

The Ludlowville here as well as at Coopersville Crk is about 100'.



4 other ostracoda

The shale is dark blue gray on the surface but dark grey with a faint suggestion of brown in section. On a sectioned surface there gave a ready effervescence with acid.

On top of this shale comes a band of ls. about 1 1/2' thick. Below the ls. fossils are most numerous but of the same kind. *M. L. lignum* is very common, + *C. setigera* + *C. lepidus*, *S. truncata*?, *Ostracoda* and *trilobites*, also *M. subulata*.

This hard 4" band of limestone forms a bench across the stream. The fauna of this band is not very prolific but the following were observed.

*P. laevis*

*N. triquetra*

a small *Strophomena*

Portion of a *Leptæna*-like animal? Fish

The shales on this ls are like those below lithologically and faunally. Fossils noted were,

*Ostracoda*,

*C. setigera*

*C. lepidus*

*Leptæna* and shell fragments of it

*P. fragilis*

*S. perrinites*

*S. furella*

*Orthis* (Pep.)

In a concretion the same fossils were noted and in addition *S. truncata*, *P. spinulicosta* and *Schuchertella cf. perrinites*.

The *Phanerostoma* bed is a puzzler now if this is it here (and it must be) it is not the equivalent of the Centerfield ls but is about 30' above it.

At the bridge and below the concretionary layer *S. perrinites* becomes very abundant. Also here are found *P. rana* and *I. sinuata* in very



Small elongate forms that come free from the shale. B. leda was taken from a concretion bed with

The *Plumrotinus* bed crosses the stream 336 paces downstream from the first bridge. 60 paces upstream the concretionary bed before noted crosses the stream. Fossils noted in the shale and concretions are: - *P. rana* c

<i>I. carinatus</i> - r	<i>S. murinum</i> w/r
<i>A. umbonata</i> (name?) cc	<i>Orthoceras</i> sp. r
<i>S. truncata</i> c	<i>Plumrotinus</i> - highly sculptured
<i>B. leda</i> r	<i>P. spinulicosta</i> c
<i>Lox. hamiltoniae</i> r	<i>S. pinnatus</i> c
<i>C. boothi</i> r	<i>Palaeoniscus</i> <sup>on</sup> <i>truncatus</i>
<i>N. corbuliformis</i> r	<i>S. fissus</i> c

This assemblage suggests an equivalent to the *Strophalosia* bed. The concretions here are rounded or in elongate masses flattened vertically. Some of them are fully 10' long. In them fossils are very abundant, particularly *Ambocoelia* and *Strophalosias*.

In the next six ft. of shale the following fossils were seen: -

*A. spiniferoides*  
*S. andaculus*  
*P. stylopura*

In the lowest 2' of shale *P. stylopura* was found with *S. granulosa*, *S. macronota*, *Streptelasma*, etc. 4" above the *Plumrotinus* occurs here a coral reef of *Heliophyllum*, *Trachypora*, *Chimera*, *Favosites* (argus) and a branching coral whose species name is *subcaespitosus* (cannot think of genus) *S. perplexa*.  
*P. stylopura*



On the shales above the reef  
*A. spiriferoides*, *S. pennatus*, *R. penelope*  
 are seen. *Pleuradictyum* and *I. cuneatus*  
 were found in the reef.

On the shales above the reef at 179 paces  
 were found *S. granulatus*

*S. concava*  
*A. spiriferoides*  
*R. fimbriata*  
 Bryozoa  
*R. penelope*  
*S. pennatus*  
*S. macronotus*

On the foot or 2 of shale below  
 the ls. the following fauna was  
 recognized at 250 paces upstream

*P. iowensis* n  
*Streptelasma corals* c      *P. punctifera*  
*S. pennatus* c  
*A. spiriferoides* c  
*R. penelope* n  
*S. munitum*  
 Bryozoa, many - rod shaped, massive, *Fenestella*  
*C. boothi*  
*P. rana*  
 Ceratopora  
*A. imbonata*

This shale is lithologically like  
 that below it represents the shale  
 below the Bonestone at the second  
 dam at Avey's

The 4" band of ls. splits readily into  
 slabs as it is pretty well weathered. This  
 stone has the following fauna: -

<i>S. munitum</i> n	<i>P. rana</i> n
<i>C. boothi</i> n	<i>S. pennatus</i> c
<i>B. leda</i> c	<i>M. pygmaea</i> n
<i>P. tenuistriata</i> n	<i>S. fissurella</i> c
<i>M. subalata</i> n	<i>Schuchertella</i> sp.



*M. oblongatus*

*A. umbonata*

*M. Truqueti*

*Palaeoneilo concentrica*

This has the largest no of *Belecypods* as far noted, except for the layer in Sholes Creek. which is the same

Following the ls are 14" of soft grey shales with

*L. pennatus* cc.

*P. rana*  
*P. rana*  
*P. rana*

*C. lepidus*

*P. tenuistriata*

*A. umbonata*

*L. parplanus*

*C. boothi*

*A. spiniferoides*

*P. punctilifera*

*C. setigerus*

*Schuchertella cf. arctostriata*

Following this shale are 3" more of ls. with

*L. frumella*

*L. munitum*

*M. subulata* cc

*B. leda* (common)

*L. pennatus*

*Palaeoneilo concentrica*

*C. tenuistriata*

*C. tenuistriata* ?

*M. oblongatus*

*P. rana*

*C. bellistriata*

*Orthoceras* sp

This is probably the *M. subulata* bed of Grabau.

Each of these 9 beds of ls. crumbles readily under the hammer but they are resistant enough to form ledges in the stream. At 290 paces upstream the 4" layer crosses.

At 325 paces soft shales with

*L. pennatus*

*C. lepidus*

*C. scitulus*

*C. boothi*

Between 325 + 535 paces there are no exposures but at 535 paces a small exposure of soft shale yielded



~~Each of~~  
 abundance of  
*L. laura* and *S. pennatus* with  
*M. subulata* and a large *Spinifer*, species  
 ? and *andulus* or *macronotus*.

At 570 paces a small outcrop gave  
 the following fauna:-

<i>A. spiniferoides</i> c	<i>P. rana</i>
<i>L. laura</i> cc	Wood?
<i>S. pennatus</i> cc	<i>N. lirata</i>
<i>A. umbonata</i> cc	<i>C. boothi</i>
<i>C. scutulus</i> c	<i>Pterinopecten</i> sp
<i>S. perplana</i> cc	<i>P. punctilifera</i>
<i>Strophomena</i> r	<i>P. muta</i>

At 664 paces the Tichenor is  
 seen about 15' above the stratum  
 Thus the sh. with *Levierulus*  
 at 570 paces is about 20" below the  
 T. Here also are numerous  
 concretions

At 720 paces are seen.

<i>A. umbonata</i> cc.	Here also concretions are prominent
<i>S. pennatus</i>	
<i>P. rana</i>	
<i>S. perplana</i>	
<i>A. spiniferoides</i>	

From 800-825 paces the shales in  
 the brook are not very fossiliferous  
*A. spiniferoides* being most abundant  
 About 2' vertical of shales are exposed  
 in the bank and where these are  
 adjacent to the soil and for a  
 half foot below they have been  
 altered to a light olive color



At 870' there is a  $5\frac{1}{2}$ " section with crumbly blue grey shales for 5'. The last foot is weathered to olive shale. At 4' vertically a reticularis *A. spiniferoides*, *Sclerissa* and *S. pennatus* were observed. On the weathered olive shales fossils are abundant. This horizon is not far below the Tichenor. Here are

*Stictopora* ec

*P. cyclos*

*R. vanuxemi*

*Fenestellidae*

*S. pennatus*

*Scleritella* act.

*S. perplana*

*S. truncata*?

*A. reticularis*

*P. rana*

*N. conserna*

*Cyrtina* hem.

*R. fimbriata*

*P. flabellum*

*Aciclopectum*

*exacutus*?

No rock is exposed from 870' - 1100' where the Tichenor is met.

### Tichenor ls.

The first layer is about 6" thick of modular imbricate crinoidal ls. with many corals, both cup and compound. One *Favosites* head measures fully  $1\frac{1}{2}$ " across.

Fossils in this lower layer are:

*Heliophylloids* of Hallé

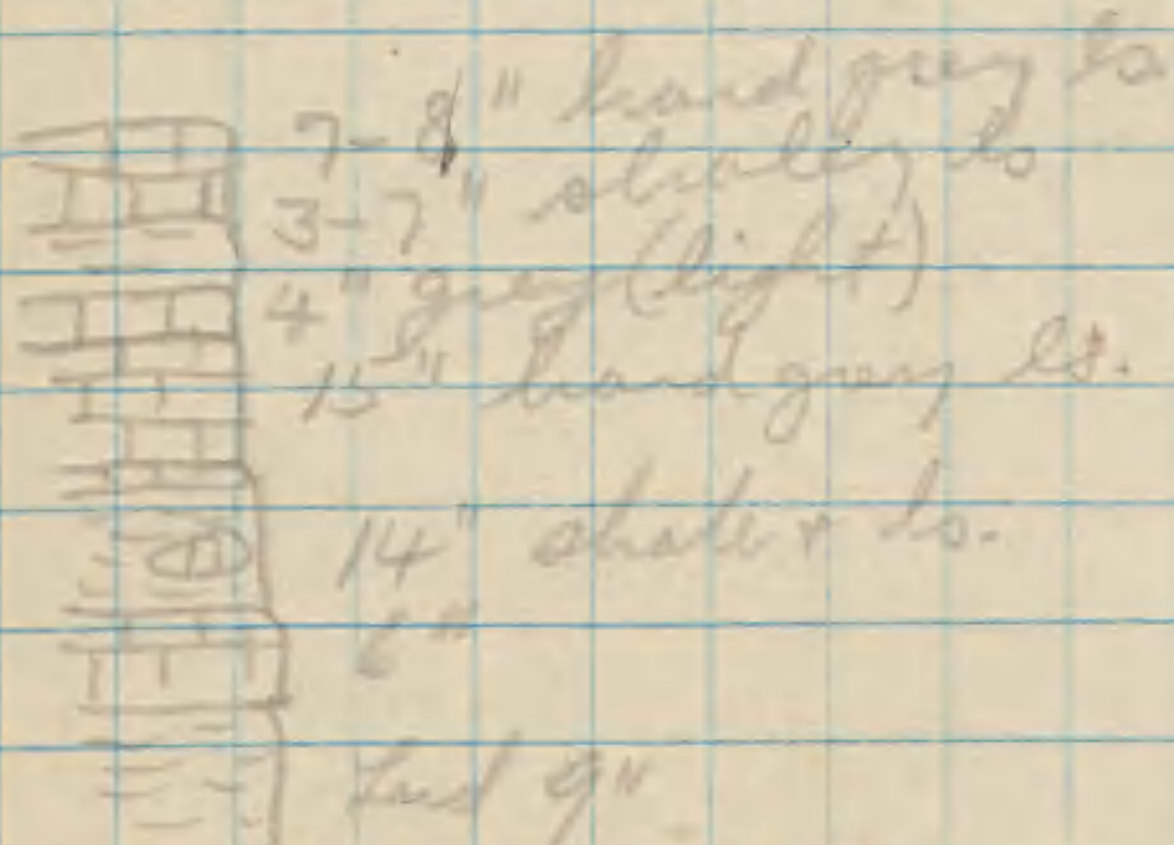
*A. spiniferoides*

*Fenestellid* bryozoa

*Favosites* hem.

*Favosites* <sup>argus</sup> sp. - small

changes with large cups.





Next comes a soft bluish grey shale thick in which corals abound, also byzozoa. Here were found: *H. halli*  
*Par. harr.*  
 Large crinoid stems  
*Spirifer* - kinds?

This is all not a clear shale as it contains lenticles of crinoidal ls with byzozoa in them in abundance. The top 5" is a crinoidal ls. On this is a 15" bed of grey crinoidal limestone that is very hard. Then 4" of light grey limestone. Then 3-7" shaley ls. surmounted by 7-8" of light grey ls. but it is not like crinoidal. The total thickness is about 51". Probably the top bed belongs to lower

Fossils in the top bed are: -

*P. rana*

*Mytilarca oviformis*

*Chonetes sp*

*D. lineatum*

*S. pennatus*

Cup coral.

The total thickness was checked by hand level and was just under 50 ft. The section may split up by interfingering shale members, watch it. Section 170 paces from highway intersection.



Fossils observed in Loose  
Dichenor blocks.

*A. decussata*

*V. pustulosa*

*L. granulosa*

*D. sculptilis*

*C. impressa*

*A. hana*

*Proetus* sp (rowi)

*R. fimbriata*

*Platyceras* sp.

*Conocardin* - in shaley material

The



July 22.  
Murder Ck

At 241 paces above the highway bridge at Daven are blue-grey shales, soft and crumbly in the creek-bed. These contain large calcareous concretions. The following fossils were discovered:

*C. scitulus*  
*S. pennatus*  
*Archeolopex sp.*  
*N. concinna*  
*Grammysia sp.*  
*T. carinatus*

At 258 paces *Pleurodictyum* with very large cups.

At 320 paces a band of concretionary limestone crosses the stream. This contains

*T. carinatus*  
*S. pennatus*  
*R. varruxensis*  
*S. perversa* ?  
*C. bellistriata*  
*Lingula sp.*

*C. boothi*

This stone is only about 3" thick.

This stone is hard and forms a ledge in the stream, it has

a very irregular fracture under the hammer.

This is succeeded by a soft grey shale containing

*C. coronatus*  
*Lingula sp.*  
*T. carinatus*  
*Chaetetes*

This shale continues to 500 paces where it is almost a mud. It is so soft and wet, the exposure is only about 2 1/2' vertical. The stone breaks into large slabs of irregular size, sometimes conchoidal in air.



surfaces. Where it is dry it crumbles. The fauna here is the most striking I have so far met. The predominant form is *J. carinatus*, very transverse & very large; next in abundance is *C. carinatus*, then *S. pinnatus*. Other fossils are

*R. grandis*?

*M. concentrica*

*C. bellistriata*

*Cystolites nitellus*

*Chitonia* sp. *convexa*

*G. lineata*

*C. bellistriata*

*C. setigera*

*Lingula* sp.

*Camartoechia* sp.

*P. rana* - large

*C. boothi*

*Pteronopent*

At 575 these shales have calcareous concretions & also the same fossils as above and in addition

*Orthis carinata*

*Ambocoelia* in shale and concretions. In the shale small jet black concretions are common, like those at Earlville railroad cut.

780 paces - blue gray disintegrated shales with *P. rana* and small black concretions. From here there are no outcrops for 656 paces where a series of rounded concretions are exposed in the stream bed.

At 1475 paces and near the Griswold highway bridge are blue gray shales with white concretions. One exposure is about 7' vertical. One and one



half feet are occupied by blue grey shales, then a thin line of concretions, then a layer of heavy calcareous, rocky concretionary in structure about one ft. Beneath this was  $1\frac{1}{2}$ ' shale. On top are about 2' shales,

soil  
 == shale 2'  
 == ls. (shaley + concretionary) 1'  
 sh  $1\frac{1}{2}$ '  
~~concretionary~~

$1\frac{1}{2}$ ' stream

Fossils noted in this exposure are  
*C. scitulus*  
*Conatopora* sp.  
*N. lineata*  
*C. pinnatifida*

About 100 paces upstream from the Griswold highway bridge are found soft shales in the brook. There are little lingers (about 1' vertically) are to be found about 1' ? (covers about 50 paces in creek) is a hard band of concretionary ls. This has the following fossils:-

*Pyramus* c  
*S. pinnatus* re  
*C. boothi* re  
*A. submarginata*  
*A. reticularis* (small + with thin ribs)  
*C. vicinus*  
*R. penelope*  
 Cup corals  
*R. fimbriata*

Some of the ls lenses in this hard shaley ls. are almost completely made up of *A. reticularis*.



in the shale below the ls. the following fossils were observed  
*Schuchertella perversa* (large)

*C. bunthi*

*Ceratopora* ?

A large *Stropheodonta*

*M. oblongatus*

*A. spiniferoides*

*P. fimbriata*

*P. emarginata*

*A. setulosus*

*A. Pleurotomaria*

About 200 yds North of the railroad crossing in the stream bed about 100 yds north of the dam the contact of the Moscow & Genesee is, 4' above stream level. The contact must cross the stream just above the dam, at about the railroad crossing. A thin layer of limestone here showed the former presence of a pyrite lens.

Above the concretionary bed are 6'-7' of soft shales, with a sparse fauna. Fossils noted were:

*C. lepidus*

*C. setigerus*

*C. mucronatus* c

*Spinifer andruschii*

*Spinifer* sp.

*Tronema* - noted in other sections of Moscow also.

A small cup coral.



468

468

This layer of ls. is about 1' thick and very nodular due to small concretions in its lower layers which are shaly. At the top of the layer the lumps are less. Many of these lumps contain well like concretions of pyrite. Pyrite concretions are abundant in the shale below this ls.

About 4' of Genesee is exposed here.



469

1928

469

July 25  
Lancaster

Bingham Quarry with upper beds now covered by pond. This is upstream from Court st. Foundry st is now called Holland Ave.

### Murder Creek.

Pleurostomus bed 5" thick is 365 paces downstream from first bridge above the Losca school.

63 paces upstream from the bridge is a concretionary layer 6' thick abounding in small Ambocoelias & like the same they are Cayugavia Creek in every respect. It is thought to be the equivalent of the Strophalosia bed altho no Strophalosia were seen in it.

Lower Trilobite bed is 240 paces upstream from bridge and is 6' above Strophalosia bed.

Fossils in the Pleurostomus bed are:

A. andaculus r	L. pinnatus c
Par. hamiltoniae r	A. granulosa
R. penelope r	S. stylogerum
A. macronotata r	C. indentata r
A. spiniferoides c	S. angularis c
P. howensis	Corals c
C. scutellus	C. subcapitatus a
Cratopora	D. inaequilobata
Pal. constricta	C. bellistata
Calculus tenuicinctus	A. decussata
R. Vanuxemi	Prana
	T. carinata

Strophalosia occur first about 2' below Trilobite beds. Other corals are about 4 1/2' below Trilobite beds in a



Layer about 4-5" thick.

Lower Trilobite bed - 4-5" - shaly ls.  
 Fauna: - *S. fuscicollis* C., *B. loda* C., *S. pinnatus* C.,  
*C. bellistriata*, *Schizostrophia*, *R. vancouveri*,  
*M. subulata*, *S. munitum*, *P. rosea*, *P. l.*  
*sternistriata* C.,

About 13" shale intervenes between lower  
 Tril. bed & concretionary bed, less 4" thick  
 Fossils in sh. *S. rosea*, *M. subulata*,  
*S. pinnatus* C., *C. loda* C., *A. vancouveri* C.

Fossils in concretionary layer are:  
*S. fuscicollis* C., *T. vancouveri*, *B. loda*, *M. subulata*,  
*P. rosea*, *S. pinnatus* C., *C. loda* C., *S. munitum*.  
 Upper trilobite bed not exposed, or present?  
 Concretionary bed exposed at 2 to 3 places.

270-546 - covered

346-655 - blue gray B-Mile Creek sh.

Dickerson at 1290 above bridge.

Lower layer is a light gray ls. with  
 small shaly concretionary shaly large  
 Favosite heads. Blue ls. 1.6-8" thick.

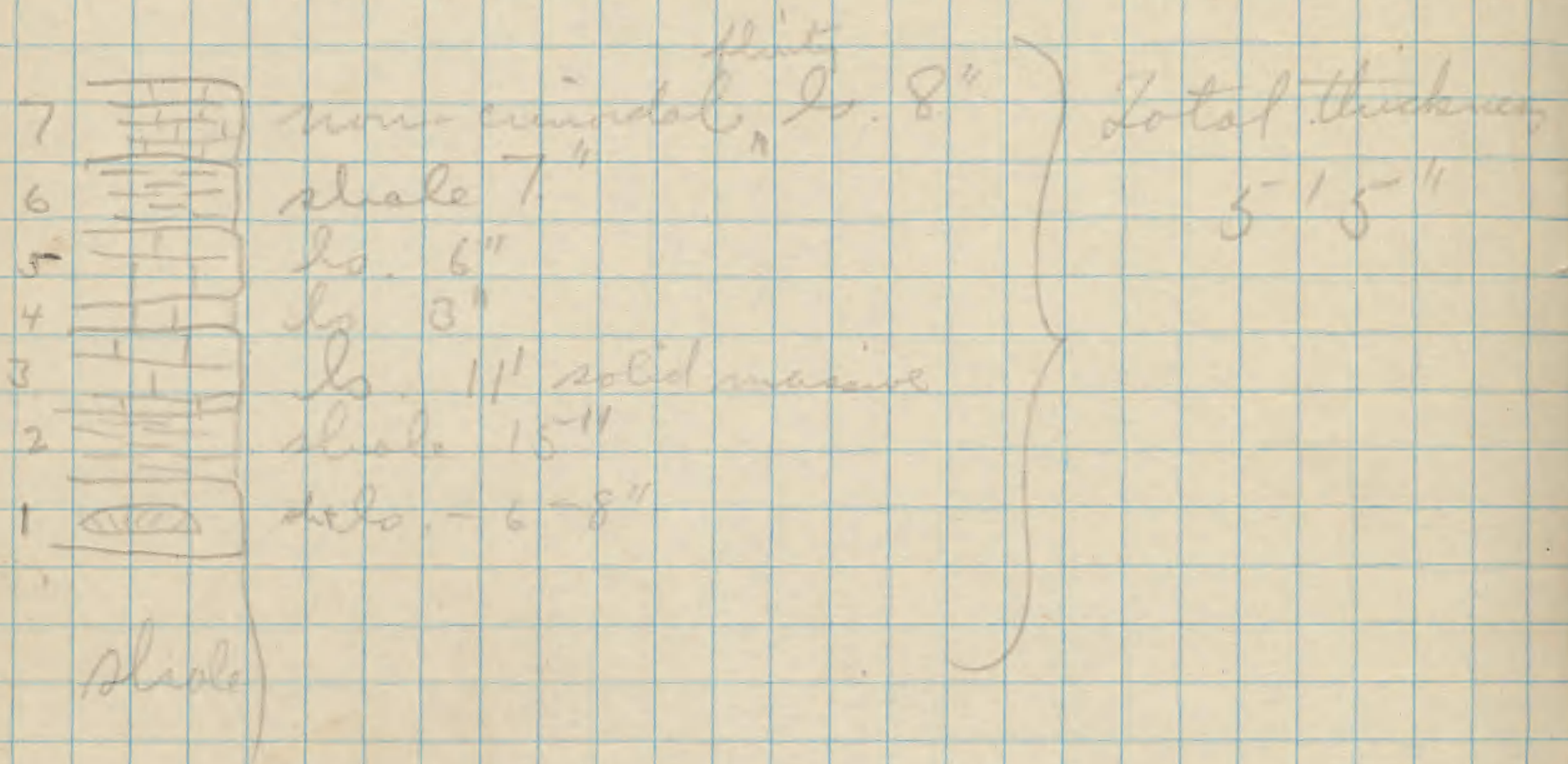
*S. junia*  
 is followed by 15" shale abounding in  
 cup corals and other fossils.

Then 11" ls. massive, like Lake Shore  
 House Creek.

Then 3" similar ls. and 6" more of same.  
 7" of shale is followed by 8" of flinty ls.  
 identical to the top layer of ls. at  
 Bull's Bridge. I shall refer this  
 provisionally to the Makoto. Also the  
 event this designation be correct the 7"  
 of shale would represent the Deep Run.



# Tichenor





Fossils in the uppermost stone are:

<i>C. induta</i>	<i>P. rana</i> c
<i>A. granulosa</i>	<i>S. pennatus</i> c
<i>Calymene</i> sp.	<i>A. spiriferoides</i>
<i>R. vancouveri</i>	

280 paces from top of Menteith to the highway bridge.

From highway 35 bridge to 260 paces upstream covered.

260 - 352

Blue grey shale, small pieces, weather to day

*A. undulata*

*P. phyloporum*

*T. carinatus*

352 - 362 - 3-5" layer of concretionary ls.

*S. pennatus* c

*T. carinatus* re

*C. coronatus* r

*C. setigerus*

*G. arcuata* r

*C. boothi*

*H. canadensis*

362 - 600

Blue grey shale

*C. boothi*

*T. carinatus*

*C. coronatus*

600 - 630 - covered

630 - 650 layer of flat concretions in shale  
concretions are at 650. in shale

*C. setigerus*

*T. carinatus* c

*C. boothi* (large)

*Chaetetes* sp.

*S. pennatus* r

*C. coronatus*

*H. corbuliformis*

*T. bellulus*

The shale contains many *Trigula* sp.

small black concretions.

650 - 1423 - covered

1423 - 6" layer of concretions in stream-bed.

1423 - 1523 - crumbly blue shale exposed  
for 7' vertical. It abounds in small  
calcareous concretions.



Fossils:-

*R. vancouveri*  
*L. vancouveri*  
*Thromus*  
*S. rectum*

*Schuchertella* sp.  
*C. vancouveri*  
*C. vancouveri*  
*C. coronatus*  
*D. inaequitrans*

I saw the last fossils seen this layer may be near the *R. vancouveri* - *Leptotheca* zone of little small pyrite concretions about 1550-1600 covered. Crossed bridge at 1640.

73 pass upstream from Burnwell bridge across shale.

73-203 bluish shale but at the top abounds in concretions for about 3'.

Fossils:-

*C. pallens*  
*R. vancouveri*  
*C. vancouveri*  
*A. actinularia*  
*S. rectum*  
*Eridophylla* (?)

*D. submarginata*  
*C. vancouveri*  
*Pholidops* *hamiltoni*  
*S. perulatus*  
*M. concentrica*

At 300 paces the *Thromus* - *Moscow* contact is  $5\frac{1}{2}'$  above stream-level.

There are two layers of concretions, one  $1\frac{1}{2}'$  below the *Thromus*, the other a "thick" the upper bed. The pyrite is  $\frac{1}{2}"$  thick here. The *Thromus* abounds in *C. lepidus*.



### Whitish Creek

Transitions bed up thinner but has same general character. The bed in the horizon of the *Strophomena* bed contains only *Ambonychia* which is the same as that seen at *Paganovia* Creek. It is succeeded by the *Strophomena* bed abounding in corals. The lowest layer of corals has especially *Strophomena* and *Strophomena*. About a foot below the top is a zone of *Strophomena*. The *Strophomena* beds are well exposed.

The *Strophomena* contains a shale a few layers at the base, followed by a layer of considerable thickness of hard crystalline limestone followed by a layer of 7" or so of a harder limestone, also crystalline, consisting of considerable flint, and is filled with quartz. This layer is covered with the uppermost *Strophomena* on the top at the *Strophomena* beds. This was the westernmost representative of the *Strophomena* limestone.



311c



BATAVIA

VALLEY

ERIE R. R.

(ATTICA BR.)

LEHIGH

NEW YORK

CENTRAL R. R.

Stafford

(BATAVIA

AND

CANANDAIGUA

BR.)

S T A F F O R D

1

Canada

Roanoke

Oatka

WESTERN

East Bethany

LACKAWANNA

Shun

2 Bar

3

Bas

Bas

E T H A N Y

Bethany

P-A-V-I-L-I-O-N

Pavilion Center

B.M.

4

ROCHESTER DIV.

Pavilion

Linden

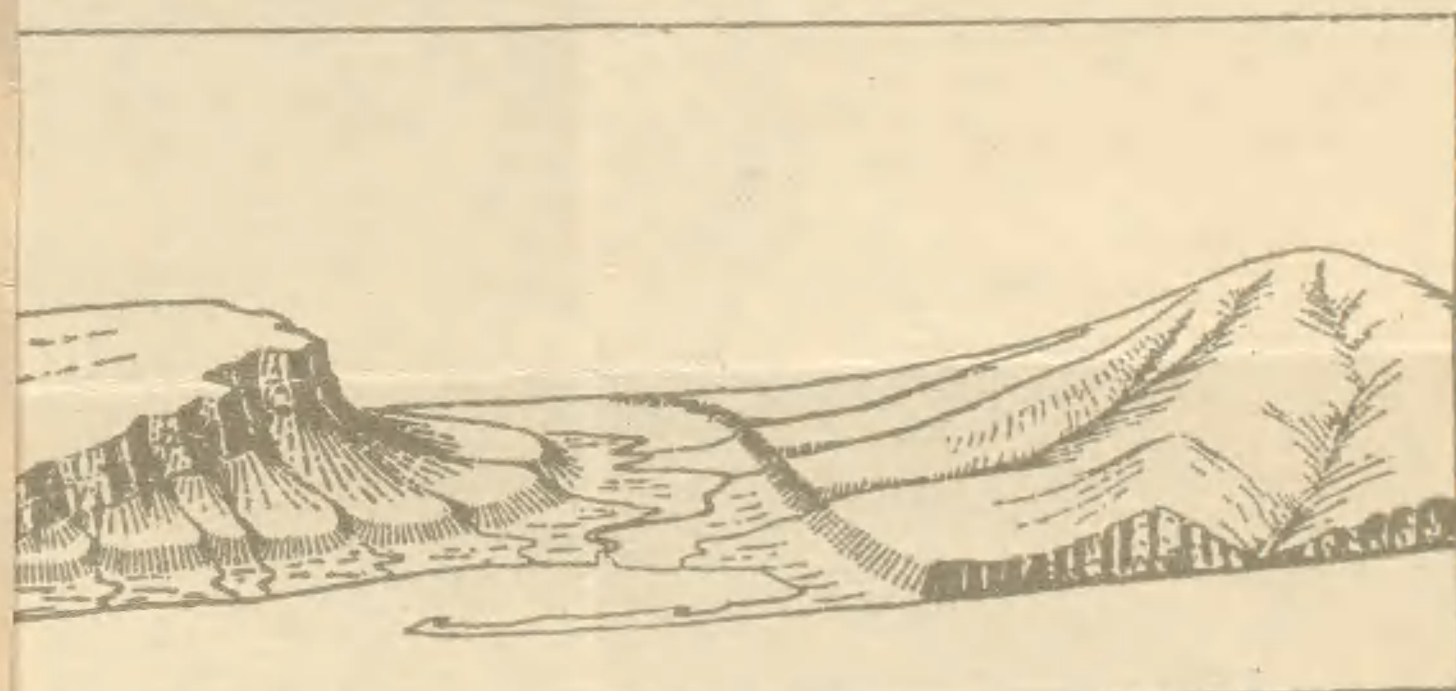
BOUNDARY LINE



The conventional signs used to represent these are shown and explained below. Variations appear on maps, and additional features are represented on maps.

Water features are represented in blue, the smaller streams by single blue lines and the larger streams, the sea by blue water lining or blue tint. Inter-  
ms—those whose beds are dry for a large part of the year are shown by lines of blue dots and dashes.

Relief is shown by contour lines in brown, which on some maps are complemented by shading showing the effect of light from the northwest across the area represented, for the purpose of giving the appearance of relief and thus aiding in the interpretation of the contour lines. A contour line represents an imaginary line on the ground (a contour) every part of which is at the same altitude above sea level. Such a line may be shown at any altitude, but in practice only the contour lines at regular intervals of altitude are shown. The sea level itself is a contour, the datum or zero of altitude. The 20-foot contour would be the first contour above the sea should rise 20 feet. Contour lines show the shape of the hills, mountains, and valleys, as well as their successive contour lines that are far apart on the one hand indicate a gentle slope; lines that are close together indicate a steep slope; and lines that run together indicate a cliff. The manner in which contour lines express altitude, form, and relief is shown in the figure below.



of New Mexico, are used in the publication of maps on a scale of 1 inch = nearly 2 miles), with a contour interval of 25 to 50 feet.

A topographic survey of Alaska has been in progress since 1898, and only 37 per cent of its area has now been mapped.





403d

## PHIC MAP OF THE UNITED STATES

full lines, but by lines of which are dry during a shown by oblique parallel s are shown by horizontal tufts of blue, and fresh-mps by blue tufts with

contour lines in *brown*. rough points which have who follows a contour on or uphill nor downhill,

use of contours not only rains, hills, and mountains rations. The line of the r line, the datum or zero sea level. The contour e sea level is the line that the sea were to rise or the such a line runs back up around the points of hills slope this contour line is ast line, while on a steep a succession of these con- the map indicates a gentle a steep slope; and if the one line, as if each were above it, they indicate a the country are depressions s. The contours of course hey surround hills. Those sinks are usually indicated shes, on the inside of the erval, or the vertical dis- e contour and the next, is each map. This interval ne character of the area

their descriptions, as well as the descriptions and geodetic coordinates of triangulation stations, are published in the annual reports and bulletins of the Survey. The publications pertaining to specified localities may be had on application.

The works of man are shown in *black*, in which color all lettering also is printed. Boundaries, such as State, county, city, land-grant, reservation, etc., are shown by broken lines of different kinds and weights. Cities are indicated by black blocks, representing the built-up portions, and country houses by small black squares. Roads are shown by fine double lines (full for the better roads, dotted for the inferior ones), trails by single dotted lines, and railroads by full black lines with cross lines. Other cultural features are represented by conventions which are easily understood.

The sheets composing the topographic atlas are designated by the name of a principal town or of some prominent natural feature within the district, and the names of adjoining published sheets are printed on the margins. The sheets are sold at five cents each when fewer than 100 copies are purchased, but when they are ordered in lots of 100 or more copies, whether of the same sheet or of different sheets, the price is three cents each.

The topographic map is the base on which the facts of geology and the mineral resources of a quadrangle are represented. The topographic and geologic maps of a quadrangle are finally bound together, accompanied by a description of the district, to form a folio of the Geologic Atlas of the United States. The folios are sold at twenty-five cents each, except such as are unusually comprehensive, which are priced accordingly.

Applications for the separate topographic maps or for folios of the Geologic Atlas should be



# LAKE ERIE





403e

L A K E E R I E

573

W E S T S E N E C A

L A K E E R I E

573

H A M B U R G

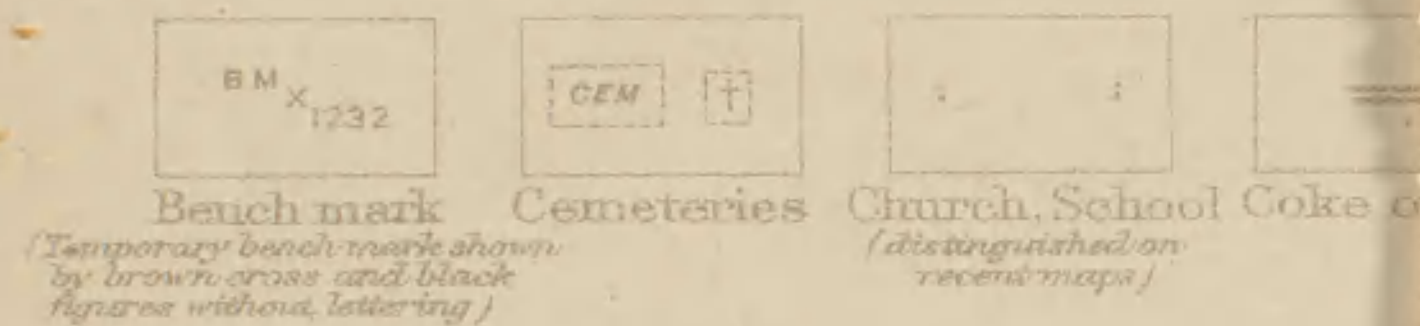
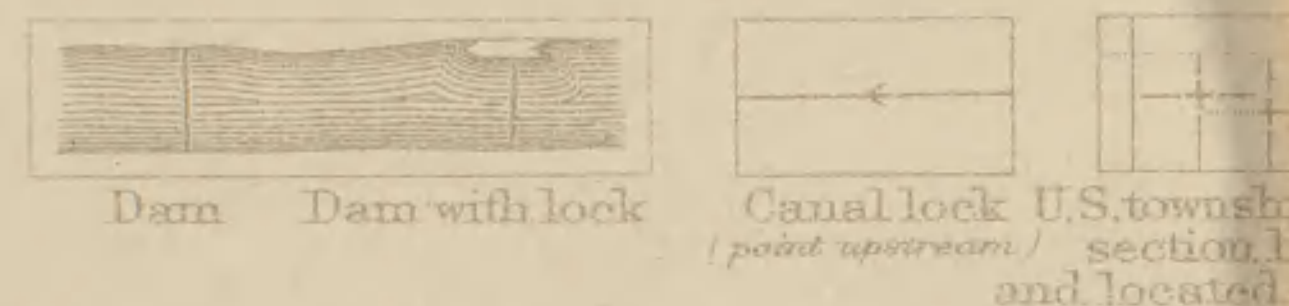
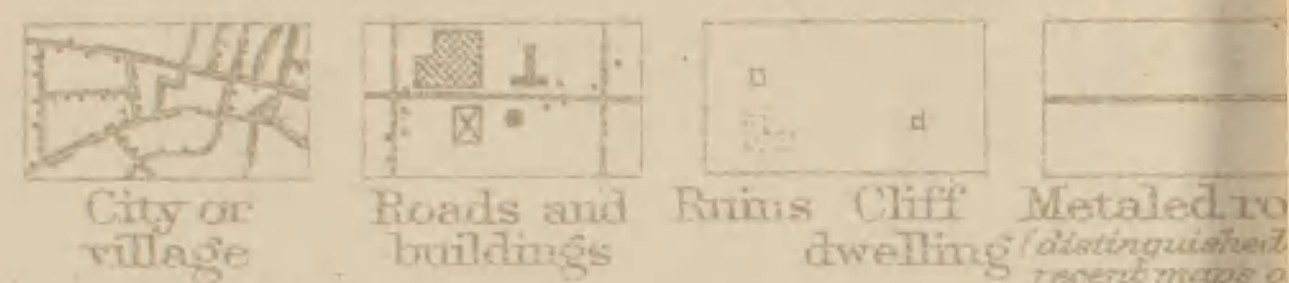
H A M B U R G

E A S T

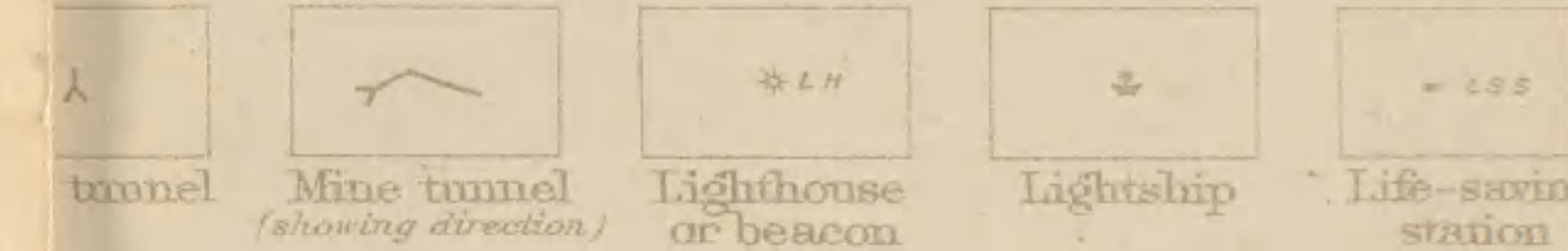
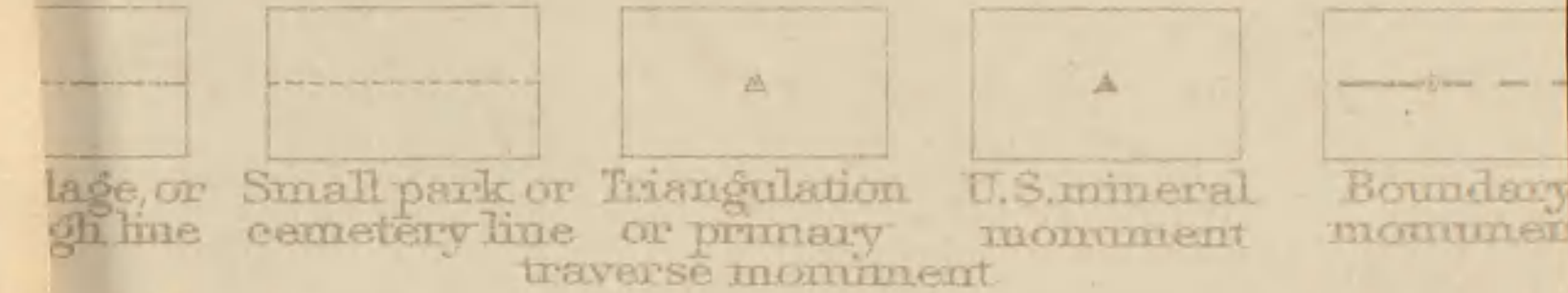
H A M B U R G



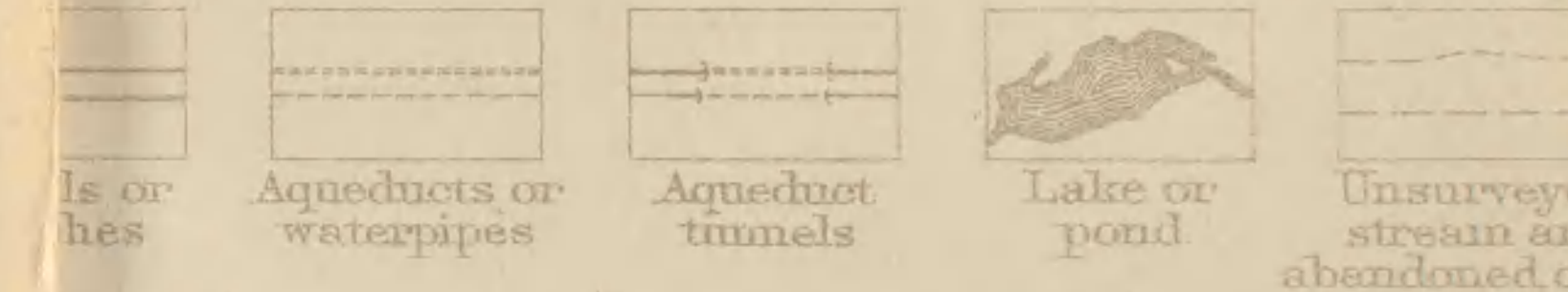




# RELIEF (printed in brown)



# WATER (printed in blue)



The United States Geological Survey is making a standard topographic atlas of the United States. This work has been in progress since 1882, and its results consist of published maps of more than 40 per cent of the country, exclusive of outlying possessions.

This topographic atlas is published in the form of maps on sheets measuring about 16½ by 20 inches. Under the general plan adopted the country is divided into quadrangles bounded by parallels of latitude and meridians of longitude. These quadrangles are mapped on different scales, the scale being fixed for any quadrangle depending on its nature and its probable future development, and consequently though the

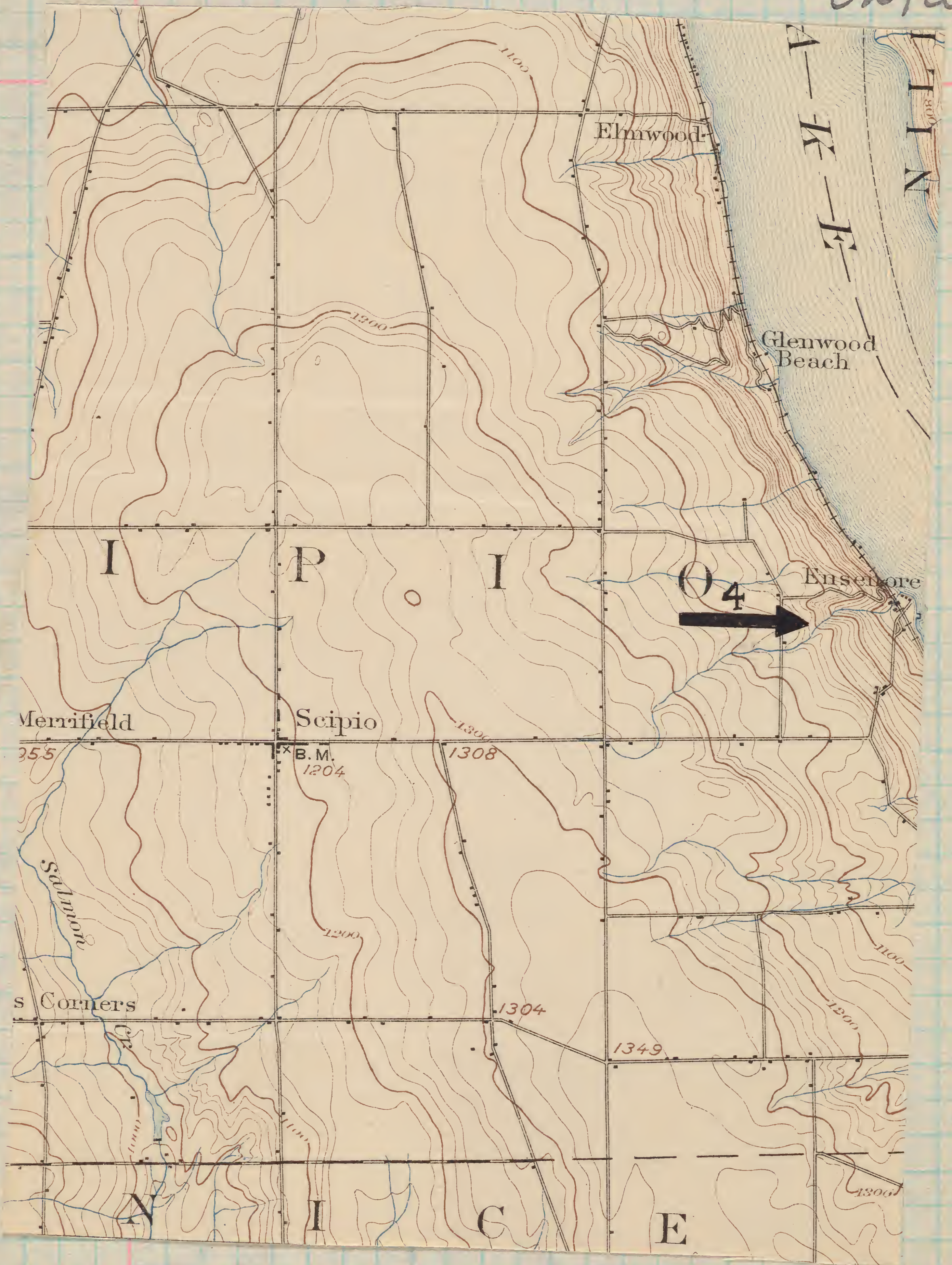
represents an imaginary line on the ground (a contour line) part of which is at the same altitude above sea level. Such a line could be drawn at any altitude, but in mapping only the contours at certain regular intervals of altitude are shown. The line of the seacoast itself is a contour, the datum or zero of altitude being mean sea level. The 20-foot contour, for example, would be the shore line if the sea should rise 20 feet.

gradually away and forms an inclined table-land that is traversed by a few shallow gullies. On the map each of these features is represented, directly beneath its position in nature, by a sketch, by contour lines.

The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval differs according to the topography of the country mapped; in a flat country it may be as small as 1 foot, in a mountainous region it may be as great as 250 feet. On the contour lines, every fourth or fifth one, are made heavier than the others and are accompanied by figures showing altitudes. The heights of many points—such as road corners, survey points, surfaces of lakes, and bench marks—are also given on the



329a





August 17.

## Ensenore Ravine

81 paces from the railroad tracks on the point and directly behind the old Ensenore Glen house is a falls and an exposure of shales in the bottom of the Glen. The shale here is non-calcareous and soft. It is dark blue grey and has many fossils: -

- |                                |                           |
|--------------------------------|---------------------------|
| <i>R. fimbriata</i>            | ✓ <i>A. spinulosides</i>  |
| <i>Cal. concentrica</i>        | ✓ <i>C. bellictrata</i>   |
| <i>Loph. hainultoniae</i>      | ✓ <i>A. reticularis</i>   |
| <i>P. rana</i>                 | ✓ <i>S. pennatus</i>      |
| <i>L. densa</i> ✓              | <i>S. antiostratus</i>    |
| <i>M. triquetra</i> ✓          | <i>C. boothi</i>          |
| <i>C. imbricata</i> ✓          | <i>Paracyclas lineata</i> |
| <i>C. mucronatus</i>           | ✓ <i>A. densata</i>       |
| <i>A. umbonata</i> ✓           | <i>Aulopora</i> sp.       |
| <i>M. pygmaea</i> ✓            | ✓ <i>P. ibicensis</i> ?   |
| <i>P. crenistria</i>           | <i>Platyceras</i> sp.     |
| <i>M. subalata</i> ✓           | <i>S. rectum</i> ?        |
| <i>M. concentrica</i> ✓        | <i>Aip coral.</i>         |
| <i>P. flabellum</i> ✓          | ✓ <i>S. granulosa</i>     |
| <i>Light. hainultonensis</i> ✓ | ✓ <i>S. audaculus</i>     |
| <i>P. constrictus</i>          | ✓ <i>C. vicinus</i>       |
| <i>M. arguta</i> ? ✓           | ✓ <i>Par hainultoniae</i> |
| <i>S. cheunigensis</i> ✓       | ✓ <i>S. pygmaea</i>       |

The fossils occur usually in layers of irregular extent, sometimes quite calcareous from crinoid remains. This is the first occurrence of *P. flabellum* I have noted so far down in the section. The falls comes at about 105 paces.

In the next 5' of rock collecting is not so easy. The shales are a dark



blue grey and rather massive giving  
no effervescence with acid. The following  
forms were observed:-

<i>S. perplana</i>	<i>S. submarginata</i>
<i>C. mucronatus</i> c	
<i>C. coronatus</i>	
<i>Pal. concentrica</i>	
<i>Prod. cf. spinulicosta</i>	
<i>P. rana</i>	
<i>D. arcuata</i>	

Between 10' 10" & 15' 15" the shales are rather  
hard, medium blue grey and calcareous.  
They are like those seen on Bloomer Crk.  
Indeed large blocks in the stream, filled  
with *Trematis* are exactly like those on  
Bloomer.

15' 15" - 20' 20" - a loose piece here contained

<i>D. sculptilis</i>	<i>R. cyclos</i>
<i>S. carinatus</i>	<i>C. mucronatus</i>
<i>S. inaequistriata</i>	<i>Cran. hamiltoniae</i>
<i>A. fenestrellid</i>	

Other fossils at this level are:-

*Pal. plana*

The brink of the falls is at about 30' above  
the 81<sup>st</sup> pace. At about 35' up a slab  
was found that contained *S. carinatus*  
in great abundance, *Cran. hamiltoniae*,  
*D. sculptilis*, *S. inaequistriata*, *Platyseras* sp.,  
*H. bellistriata*, *S. arctostriatus*, *S. perplana*,  
*C. setigerus*, *Par. hamiltoniae*, *Rhipidomella* sp.,  
*M. concentrica*,

This was essentially a calcareous lens  
and as far as I can see is identical  
to similar lenses, which are found  
because the matrix is sandier, at  
Fertile and Stock Farm.

The rock in the face of the falls from  
25' - 27' is a hard calcareous shale  
like most of that at Bloomer. At 27'



a rather large cup coral was discovered  
about 38 paces above the brink of the  
falls the following were noted:-

✓ <i>R. fimbriata</i>	✓ <i>D. caninus</i>
<i>P. rana</i>	<i>Camarotoechia</i> sp.
<i>Pal. concentrica</i>	<i>Pal. hamiltoniae</i>
<i>E. itys</i>	✓ <i>D. sculptilis</i>

*Grammysia* sp (small)

From the Brink of the falls to 229  
paces above the same brittle shales are  
traversed varying but slightly & usually  
in lime content & degree of hardness.

Fossils noted in addition to those  
recorded above are *N. oblongatus*, *S. granulosus*,  
*L. delia*, *P. stylopoda*.

At 229 paces is a very fossiliferous layer  
abt 7 the shales a foot below carry small  
concretions. Fossils here are:-

✓ <i>D. caninus</i> c ✓	✓ <i>D. truncata</i> rre
<i>N. concinna</i> c ✓	<i>S. andaculus</i> c
<i>Pal. hamiltoniae</i> r ✓	<i>B. crenistria</i> r
<i>P. rana</i> r	<i>S. inaequistriata</i> r
<i>N. oblongatus</i> r ✓	✓ <i>M. mytilloides</i> r
<i>Pal. concentrica</i> r ✓	<i>V. pustulosa</i> ?
<i>C. complanata</i> r ✓	
<i>Cran. hamiltoniae</i> r	
<i>C. mucronatus</i> (?) ✓	
<i>R. vanuxemi</i> r ✓	

Terebratulids

*N. varicosa* r ✓

*Cyclonema* sp. r

*C. bellistriata* r ✓

*D. sculptilis* r ✓

*R. fimbriata* r ✓

*N. bellistriata* r ✓

*M. concentrica* r c

*Lox. hamiltoniae* r

*Aviculopecten* sp r

*A. spiriferoides* r ✓

*A. decussata* r



The horizon with *V. pustulosa* is about 23-25' above 1st Fall.



This horizon is approximately 21' above the brink of the falls.

At 250 paces comes a calcareous lens abounding in *S. granulosa*. Other fossils are:-

<i>M. concentrica</i>	✓ <i>A. spiniferoides</i>
✓ <i>C. scitulus</i>	<i>P. patulus</i>
<i>M. mytiloides</i>	✓ <i>V. carinatus</i>
✓ <i>D. sculptilis</i> re	<i>Cyclonema</i> sp
<i>Gon. hamiltonensis</i>	✓ <i>S. andaculus</i>
✓ <i>N. concinna</i>	<i>A. decussata</i>

At 278 paces another zone is like that above having *S. granulosa*, *S. andaculus*, *M. mytiloides*?, *V. pustulosa*, *S. perplanus*, *D. carinatus*, *R. varicosa*, *M. concentrica*, *A. spiniferoides*, *N. concinna*, *P. oviformis*, *C. coronatus*, *T. truncata*, *P. stylosa*, *P. plana*, *A. decussata*, *D. sculptilis*, *R. varicosa* — contains considerable pyrite. On top of the shales at 278 come the black shales with *L. laura*.

Other fossils at 278 are *S. obsoleta*, *N. oblongata*, *Selmechertella*, *N. varicosa*, *Orbitolidea*, *A. spiniferoides*.

At 569 paces the land-level is used on a high falls. Fossils noted in these shales are:- *Anulopora* sp., *M. subalata*, *S. permatu*, *L. laura*, *P. plana*, *C. boothi*, *N. trigonatus*, *N. corbuliformis*, *C. bellistriata*, *L. laura*, *S. subalata*.

Fauna 21' 8" above 569 pace:-

<i>C. bellistriata</i> c	<i>A. spiniferoides</i>
<i>P. discordum</i>	
<i>N. corbuliformis</i>	
<i>M. subalata</i> c	
<i>A. umbonata</i>	
<i>Lox. hamiltoniae</i>	
<i>N. lirata</i>	
<i>Orthis</i> sp.	



$$\begin{array}{r} 6 \\ 96 \\ \hline 102 \end{array} \quad 121$$

8)

$$\begin{array}{r} 100 \\ 20 \\ \hline 120 \end{array}$$



32' up were found *P. spinulicosta*,  
*L. laura*, *C. bellistriata*, *P. discoidium*  
 and *Orthoceras* sp. At about 44' up in  
 dark blue grey shales the following were  
 found: -

*S. rectum*, *Pal. concentrica*, *O. parvula*,  
 Between 48 & 54' the following were  
 seen: - *M. subulata*, *L. laura*, *S. pennatus*,  
*S. minutum*, *Cyclonema* sp.,

Between the 10th & 15th steps (54-60' up) the  
 following were seen: - *M. subulata*, large,  
*S. pennatus* (very long winged), *M. triquetrum*,  
*M. oblongatus*, *Orthoceras*.

At 59' 19" *Pal. concentrica*, *Sphenotus*,  
*G. subulatum*, *S. pennatus*, *C. elongata*,  
*A. spiniferoides*, *M. oblongatus*, *S. minutum*,  
*B. leda*, *P. fragilis*, *P. radiata*, *A. umbonata*,  
*I. submarginata*, *S. concava*.

Fauna between 18-19 steps: - 103'

*A. spiniferoides*

*Pal. tenuistriata*

*S. pennatus*

*C. setigerus*

*Pal. concentrica*

*M. oblongatus*

*M. pygmaea*

The shales here appear more  
 massive and have so since the 11th  
 step. Shales like this & with a similar  
 Fauna are present in Pattersons Glen  
 on the Morrisville quad.

The top of this sub-falls is at 116' 24"  
 and here a hard layer of coarse  
 shale, non-calcareous forms. The falls  
 fossils are not abundant here either.  
 Those noted are: - *C. scitulus*, abundant,  
*C. bellistriata*, *S. pennatus*, *A. spiniferoides*,  
*A. decussata*, *S. pygmaea*, *Homophora* sp.,  
*C. setigerus*, *P. rara*.

The coarse, hard shales continue about  
 3' above the falls when a softer stone  
 is encountered.



$$\begin{array}{r}
 23 \\
 \underline{5} \\
 115 \\
 \underline{7} \\
 104
 \end{array}$$

9

$$\begin{array}{r}
 130 \\
 \underline{10} \\
 141
 \end{array}$$

10



At 126' above the 569 place in the cascade above the 2nd falls was noted a thin ss. band. Above this the shales become somewhat more fossiliferous. Below it they are rather hard, tho softer than those at the brink of the 2nd falls. Fossils below these thin ss (1") were *S. pennatus* + *M. triquetus* + *M. oblongatus*.

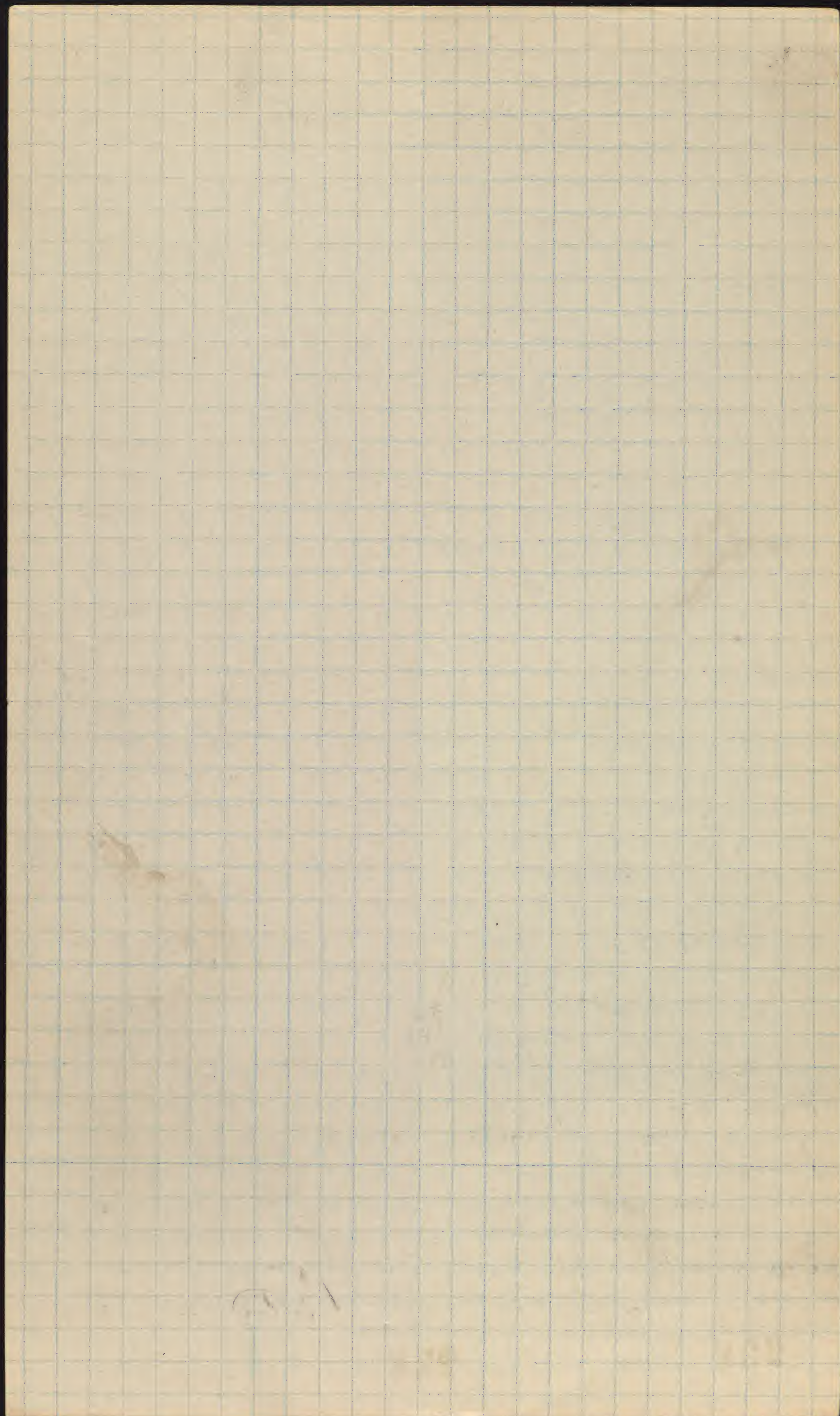
Above these ss at 130' above the 569<sup>th</sup> place came many *C. scitulus*, *I. submarginata*, *M. concentrica*, *S. pennatus*. At 141' 10" is a hard band about 10" thick that forms the 3rd falls or cascade above the 2nd Falls. This band is hard and is calcareous in places. A concretionary mass in it contained *S. pennatus* in abundance and *C. scitulus* in abundance, *I. carinata*, a terebratulid, *A. decussata*, *P. tenuis*?, *M. concentrica*.

In the shales below *C. scitulus* was common, broad-winged *S. pennatus*, + *O. carinata*.

Above this hard band at 141' <sup>above 569</sup> the shales are much finer but the 10" of rock just on the hard band is calcareous + very fossiliferous. It contains *A. spiniferoides*, *S. rectum*, *C. boothi*, *S. macronotus*, *D. sudaculus*, *S. concava*, *C. scitulus*, *P. flabellum*?, *C. coronatus*, *A. decussata*, *M. oblongatus*, *P. concentrica*, *P. variegatus*, *P. rana*. In places this layer is a ls. made up mostly of fossils. *S. perplana*, *A. reticularis*, 1 of

In the rock that succeeds this there are calcareous bands + lenses with many fossils. The fauna in the 5" 5" above the hard band noted at 141' above 569 place follows:-







- ✓ *C. bellistriata* cc
- ✓ *Pal. concentrica* <sup>constriata</sup>
- ✓ *S. macronotus*
- ✓ *P. iowensis*
- ✓ *M. concentrica*
- ✓ *C. scitulus*.

Much of the rock between 141 and 144' is calcareous.

*P. rana*

- ✓ *C. coronatus*

- A. spiriferoides* cc
- Orbiculoides* sp
- ✓ *M. pygmaea*
- ✓ *S. perplana*
- ✓ *S. macronotus*
- ✓ *S. andaculus*
- between 141 and 144'
- ✓ *M. oblongatus*
- ✓ *S. pennatus*
- S. rectus*

In the shales between 146' 5" and 151' 10"

- C. bellistriata* cc
- Rhipidops hamiltoniae* cc
- ✓ *S. pennatus* cc
- ✓ *M. oblongatus*
- ✓ *P. radiata*
- S. cheungensis*
- ✓ *P. tenuistriata*
- P. discoidum*
- M. pygmaea*.

- ✓ *Pal. concentrica* <sup>constriata</sup>
- ✓ *M. varicosa*
- ✓ *M. triquetra*
- R. hamiltoniae*
- P. leda*
- ✓ *P. tenuis*
- ✓ *M. corbuliformis*

Between 157 & 173' above the 569<sup>th</sup> part the shales have become harder under the hammer and at 173 the fauna appears to be changing. The fauna at 152 had many *A. spiriferoides* & *S. pennatus*. At 173' were noted:-

- ✓ *P. flabellum* c
- ✓ *M. concentrica* cc
- ✓ *S. granulatus*
- Rhipidomella* sp.
- ✓ *P. oviformis*
- ✓ *Par. hamiltoniae*
- Orbiculoides*
- ✓ *J. carinatus*
- ✓ *S. pennatus*.
- ✓ *R. vancouveri*
- ✓ *C. bellistriata*
- A. princeps*

Additional fossils noted between 173 & 180' are:-

- P. radiata*
- C. scitulus*

- S. perplana*
- P. rana*

increased abundance of *A. spirifer*



141

13  
5  

---

65  
5  

---

70  
141



At 184' above 569 were found *S. demissa*,  
*S. inaequistrata* and above here the  
 shales seem to become much softer.  
 Other fossils were *A. spiniferoides*, *C.*  
*C. bellistriata*, *S. granulosa*.

At about 186' (2' above the 8<sup>th</sup> step above  
 141) the rock is calcareous, made up  
 mostly of fossils and forms a flat  
 here was noted *Cran. harringtoniae*, *S.*  
*arcuata*,

At 10 steps above 141' the shale is  
 calcareous. Between 12 + 13 besides  
*T. carinatus* + *T. novus* only a  
*Spinifer* like *S. Dullius* was noted.  
 This condition was seen at Sheldrake.  
 The Tichenor comes at 211' above 569.  
 + is a xln grey ls. on it are 5 1/2 - 6'  
 of shale + ls. alternations but no  
 attempt was made to collect these  
 or the Tichenor.

The ls. on the Tichenor has:-

*S. pennatus*  
*T. carinatus*  
*H. dekanji*

*P. roana*  
*CameroTerebra* sp.



## Essexmore.

The lowest shales in Essexmore and up to the dark shales, amounting to over 30' have a prolific fauna with a few corals, also *U. pustulosa* at the top. This centerfield must expand to yield the interval of shales from the top of the Shannockites to at least the top of the Fertiland Stock Farm horizon. A few of the *Pelecypods* found in the lower part of the Ludlowville just behind the Old Essexmore Glen House, such as *P. flabellum*, *P. lutea*, & *M. arguta* are very suggestive of the Gifu horizon.

The dark shale horizon seemed somewhat coarser and rather lighter than on the east side of Cayuga Lake. I suspect thickness I could not determine, but it must occupy most of the red falls. A *Spiniferoides* horizon in practically the whole of the upper part of the Ludlowville.

Cleland's *Tellinopsis* zone I did not recognize. The *Glypta* below the Trichmor was quite barren but had *T. carinatus* & a *Spinifer* like *S. Tullens*. I did not recognize it. This condition was also noted at Sheldrake. The *S. demissa* and *P. flabellum* combination was also noted on Lake Erie.

Where *P. flabellum* came in and above there was a very noticeable falling off in the numbers and kinds of fossils.



338a





## Fall Brook

At 225 paces from the intersection of the railroad with Fall Brook was found the first outcrop. This comprised about 100 yds. of bluish grey shales in the strata bed. About 3' vertical of these shales are exposed. These are blue-grey on the surfaces of chips but in section are a somewhat darker grey. They weather to a dark ashen grey or light olive color where leached. They give practically no effervescence with acid.

Fossils: -

*C. coronatus* c

*T. cuneatus* c

*Cystodictya*

*Trigula* sp.

*L. pinnatus*

*C. setigerus*

*L. andaculus*

*Tetradactylus* (*Cryptonella*)

*O. undulata* ac

*Grammysia* (*Anto-arcuata*)

*H. dehayi*

*P. stylopoda* (*large cups*)

*Avicullipora* 3 sp.

*R. fimbriata*

*B. spiniferoides* or

Most of the fossils are to be found in calcareous accumulations, <sup>more resistant than surrounding strata</sup> made up mostly of fossils, bryozoa, crinoid stems etc. In the shale the commonest fossils to be found are: - *T. cuneatus*, *C. coronatus*, *L. pinnatus*, *C. scitulus*, *C. setigerus*, *O. undulata*, *C. boettii*. These shales have much the same look as the Earlville shales.

*Proetus* sp.

*G. bisulcata*

Bryozoa (abundant in patches)

*M. oviformis*

*M. concentrica* ?

This bed must be the same horizon as *O. undulata* & *H. dehayi* on Bowen's Brook.



At 410 paces across a foot vertical of shales under an overhanging bank. These are somewhat more massive than those below as they break into large chunky blocks. They yielded

<i>P. rana</i>	<i>Palaeoniscus concentrica</i>
<i>Pholidops Hamiltonianae</i>	<i>Ambocoelia</i> sp.
<i>P. oblata</i>	<i>O. wisconsin?</i>
<i>C. lepidus?</i>	<i>Loxonema</i> sp.
<i>C. setigerus</i>	

Combine with that below

At 445 paces weathered concretionary shales gave *C. mucronatus*.

At 600 paces Moscow shales gave the floor of the brook. Here are found *P. rana*, *C. bellistriata*, *C. mucronatus*, *P. penelope*, *S. gemmatus*. *Ambocoelia*<sup>cc</sup> occurs here in very great abundance at times making up the entire rock. *S. piflana*.

At 625 paces we are still in the *Ambocoelia* zone which is succeeded at 642 paces in the stream bed by a zone with large *Spirifers*, coral, *A. reticularis* and *A. spinosa*.

Additional fossils found in the *Ambocoelia* beds are:

<i>A. spiriferoides</i>	<i>C. coronatus</i>
<i>Tronurus</i>	
<i>Pal. concentrica</i>	
<i>P. mitta?</i>	

Fauna between 642 paces and 697 paces

At 697 paces a hard concretionary band of ls. crosses the stream bed and here forms a long flat in the brook.

Fauna between *Ambocoelia* bed and ls:



- |  |                            |
|--|----------------------------|
| ✓ <i>A. spinosa</i> c                            | <i>M. concinna</i> r       |
| ✓ <i>A. reticularis</i> cc                       | <i>S. perversa</i> r       |
| ✓ <i>R. vanuxemi</i> c                           | <i>C. viridula</i> vr      |
| <i>Taraxacum</i> c                               | <i>C. bellistata</i> vr    |
| ✓ <i>S. andaculus</i>                            | <i>C. scutellus</i> vr?    |
| <i>S. inaequistrata</i> r                        | <i>R. cyclos</i> vr        |
| <i>Pteronopsecter</i> 2 sp.                      | <i>A. spiniferoides</i> vr |
| ✓ <i>R. penelope</i> vr                          | <i>Platyceras</i> sp.      |
| <i>C. coronatus</i> r                            | <i>R. fimbriata</i>        |
| <i>S. pennatus</i> r                             | Crinoid stems              |
| Massive byzonia, fenestellids <i>C. boothi</i> . |                            |

As one approaches the ls. vertically the *Atrypas* become less abundant and no *A. spinosa* was seen for at least 1 1/2' below the ls. at the base of the ls. *D. consobrinus* becomes common in beautifully preserved forms. Other fossils observed at the contact with the ls. and about a foot below are:-

- A. reticularis*
- Sheptelasma* corals
- A. spiniferoides*
- P. rana*
- S. pennatus*.

Not a single *Ambocoelia* has been seen since the *Ambocoelia* bed

Fossils observed in the 4" ls. band are:-

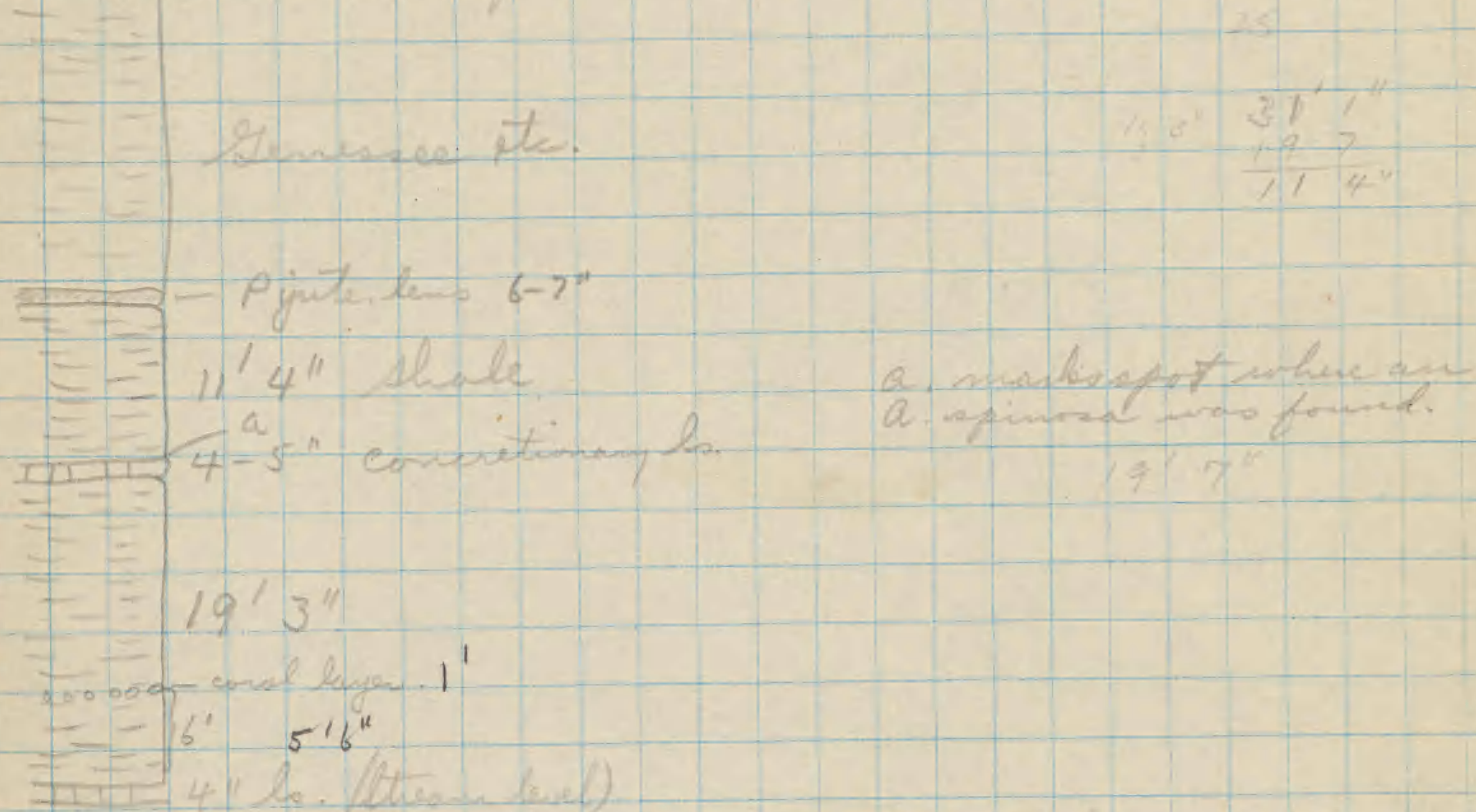
- |                                     |                    |
|-------------------------------------|--------------------|
| Small corals. c.                    | <i>R. vanuxemi</i> |
| <i>S. pennatus</i> (without points) |                    |
| <i>P. tenustrata</i>                |                    |
| <i>C. viridula</i>                  |                    |
| <i>P. rana</i>                      |                    |
| <i>Pal. concentrica</i>             |                    |
| <i>Schuchertella</i> sp.            |                    |
| <i>Conrotocchia</i> sp.             |                    |



In places the ls. is hard and dark grey bedded Crinoid stem segments. It may be the equivalent of the Menteth ls. else others it is shaley and still may be concretionary with a blue grey color and concretionary structures.

The stone on this calcareous band contains small corals and *A. reticularis* so that it is quite probable that this sep. ls. represents only a change in sedimentation and not in fauna.

### Section at 710 paces



The shale on the 4" ls. band yielded the following species:-

*A. reticularis*

*S. inaequistrata*

*A. spiriferoides*

*S. pennatus*

*Pholopora*

Large *Spirifers*

*S. macrostus* c

*S. andacrus* c

*Cyrtina* Ham.

Crinoid fragments

*C. boothi*

*P. rana* (large)

*S. tullius* ?



This fauna continues up for about 2 or 3 feet where the shales become sparser in fossils until 6' above the ls (4") band comes a layer with many corals (as seen at Little Bear's Creek) with *Heliophyllum* and *Cystiphyllum*.

At 760 paces a small cut allows study of the rocks above the 4" ls. The bottom of the coral bed is at 5' 6" above the 4" ls. and it is a foot thick. It has besides corals:-

*S. pinnatus*

*A. spinosa*

*R. vanuxemi*

About 1' above the coral bed was found

*I. carinatus*

*A. spiniferoides*

*S. granulatus*

*S. inaequistrata*

and for 5'

10' 10" above 4" ls. comes *A. reticularis*, *R. vanuxemi*, *Streptelasma*, *A. decussata*. Then at 19' above the 4" band comes the second concretionary band of ls. Below this band large *Spinifers* are common. The contact with the Genesee is exactly 2' 10' 10" above the second ls. band. at 760 paces.

The falls is at about 890 paces.



The upper concretionary layer has  
*A. reticularis*,

Fall Brook could

At the falls the lower 20' are Moscow but are not favorably exposed for collecting. However collecting is favorable above the upper ls. ledge on the south side of the brook. Here the ls. itself, which is a hard grey ls. carries *A. reticularis*, *P. rana*, *F. enestellids* *A. spinosa*.

On the concretionary ~~str~~ limestone occurs a layer of local stone of a calcareous shale, quite hard with ~~some~~ <sup>small</sup> crinoid fragments and other fossils. In this were found:-

*A. reticularis*  
*A. spinosa*  
*A. spiniferoides*  
*P. rana*  
Bryozoa  
*Aviculogaster*

The shale for about 5' above the concretionary ls. is light grey. ~~That about~~  
This shale contains

*C. indenta*  
*C. boothi*  
*P. rana*  
*M. subumbona*  
Bryozoa

*A. reticularis*

Shale 4' below the pyrite contains pyrite concretions sometimes many of the pyrite masses are pyritized shells and in this case are *Lophoceras* and a *Pleuronomaria*, here also 2 *lingulas* were found and some large *Spinifers*.



In the shale just below the coral bed and on the zone containing the abundance of large *Spinifer* occurs another with the following species:-

*L. laura*

*Orbiculoides*

*A. praecumbens*? (large)

The upper ls. is one that is very distinct and here can be followed with great ease.

Several distinct zones are here recognizable:-

1. There is a *S. consobrinus* and *A. spinosa* zone below the lower ls.
2. On the lower ls. lies a zone with many large *Spinifer*, <sup>for. P. laura</sup>, *Platyceras* etc. This gives way to a zone <sup>also *P. laura*, *P. laura*, *P. laura*</sup>
3. With *L. laura* and *Orbiculoides* and this to
4. The coral zone with *Cystiphyllum*, then
5. Fossils like those on the lower ls. (zone 2) are found till the upper ls. is met.
6. Fossils like zone (2)
7. Somewhat barren shale with pyritized snails, *Lingula* and an occasional large *Spinifer*
8. Pyrite
9. *Senecio*

Below the *consobrinus* zone an *Ambocoelia* zone could be recognized and considerable below this one with many *S. carinatus* & *Pecten* pods.



On the stream-bed about 100 yds below the falls is a huge concretion calcareous but containing a layer of pyrite 1" thick and two feet in one direction and 3 in the other at st L.S. clt contains large sponges, and cup corals. clt is in the zone 2 on the lower ls. and about 3' below the coral bed.

From 450-460 pages 6" of Salicarpus sh carries an abundant fauna:-

*P. rana* cc

*Fenestellidae* cc

*Platyceras* cc

*Cup corals* c

*D. sculptilis* c

*D. lineatum* cc

*D. perverus* or

*Cryptonella* or

*C. coronatus* or

*A. reticulatus*

*C. vicinus*

*A. decussata* or

*C. in depth* or

*P. liserata* or

*A. spiniferus* or

*I. spinulata* or

*R. variegata* or

*M. concinna* or

*Favosites* c

*M. oviformis*? or

*R. fimbriata* or

Crinoid fragments

in places the rock is a very soft shale but the upper ledge at 460 paces is rather hard having crinoid remains in it.



## Gall Brook

183 paces from RR bridge 5' crumbly blue shale, sparse in fossils

*Pholidops ham-*  
*C. setigerus*  
*C. bothri*

*Lypommatus*  
*L. purplana*

The top of the outcrop is at about 586'. The outcrop extends from 183-200

200-213 covered

213-242 - 3' high - flashing shale typical *Cal. constricta* and *C. coronatus*

242-406 covered

406-460 - blue shale capped by a somewhat calcareous and concretionary layer 3" thick.

*P. rana*

*A. umbonata* c

*L. purplana*

*Pholidops ham* c

*C. setigerus*

*D. lineatum*

*L. pectinatus*

I believe this is the top of the flashing shale and corresponds approximately to the concretionary bed with little black concretions. The *Ambocoela* come in a little below the calcareous bed.

The bed is about at 592' AT

592'

460-494 - covered

494-510. 3' discolored shale - no fossils

510-544 - covered

544 - 3' shale in bank

*A. umbonata* a

*P. rana* c

541-578 - mostly covered, a few patches with *A. umbonata*.

578-690

*Ambocoela* beds: *f. rana*;

*A. umbonata* a

*Pholidops ham* c

*Pal. constricta*

*L. pectinatus*



12/30



*A. submarginata*  
*C. scutellus*

*A. spiniferoides*

At 670' were seen the first *A. spinosa* which come in abruptly. They come in at approximately ~~the~~ <sup>the</sup> fifth step over 579, or 608' A.T. This makes the *Ambocoelia* bed about 16 feet thick and the bed with the *Atrypas* about 3'!

Fossils in the *Atrypa* bed are:

<i>A. spinosa</i> c	<i>A. reticularis</i>
<i>S. reticularis</i>	<i>D. consobrinus</i>
<i>C. boothii</i>	<i>C. incipiens</i>
<i>C. ambonensis</i> sp.	<i>Cyrtolentulus</i> sp.
<i>A. sublacina</i>	<i>M. bidatum</i>
<i>A. playus</i>	<i>P. sara</i>
<i>A. coronatus</i>	<i>D. inaequistratus</i>

The *Atrypa* beds extend from 690-761.

A hard layer at 761 forms a cascade in the falls creek. The hard layer is about 1/2" thick.

*A. spinosa* ranges to about 1 1/2' of the hard bed. This layer with *Atrypas* is thus about 1 1/2' - 2' thick.

Hard layer - much of it is shaly and it only shows completely on the cliff side. Shaly to contain:

<i>A. marginatus</i> re	<i>P. sara</i> re
<i>S. reticularis</i> c	<i>A. reticularis</i> re
<i>D. consobrinus</i> re	<i>D. inaequistratus</i> re
<i>C. ambonensis</i> re	<i>P. sara</i>

4-6" of the hard layer in the middle is of hard limestone.

592

59 50  
- 4  
55  
57 50  
- 5  
52 50  
- 5  
47 50  
- 5  
42 50  
- 5  
37 50  
- 5  
32 50  
- 5  
27 50  
- 5  
22 50  
- 5  
17 50  
- 5  
12 50  
- 5  
7 50  
- 5  
2 50



Pennsylvanian

# Section on Fall Brook

11' blue shale

concretions 6"

13' shale

coral bed 15"

19" black shale *a. praeumbona*

5' soft blue shale

hard layer 16"

1 1/2'

1 1/2'

*a. spinosa*

*a.*

*U. sp.*

14'

19  
3  
1  
5  
1  
1  
13  
11  
56

19  
3  
1

19  
5  
7  
3  
2  
1  
3  
6  
11  
51

5  
1  
3  
11  
66

Roanoke shak must be nearly 80' thick



Fossils in the shale above the band bed:

<i>A. andacula</i>	<i>P. rana</i>
<i>A. reticularis</i>	<i>S. rectum</i>
<i>C. dichotoma</i>	<i>J. unguis</i>

This bluish shale is 5' thick.

This is followed by 19" (7") of dark <sup>nearly black</sup> ~~green~~ shale containing:

<i>A. praeumbona</i> r	<i>L. laura</i>
<i>A. umbonata</i> c	<i>O. media</i>

Fauna above concretionary bed 11' below Seneca

<i>A. andacula</i>	<i>Eridophyllum</i>
<i>S. rectum</i>	<i>P. rana</i>

Fossils are scarce in the upper 4 or 5'.

Fauna of coral bed: -

<i>Eridophyllum</i>	<i>A. spinosa</i>
<i>Cystiphyllum</i>	<i>A. reticularis</i>
<i>A. andacula</i>	<i>Cyst. trum</i>

813 pice *A. praeumbona* bed 3' above stream. 813 corresponds to 7th H.L. step

823 - 950 - Big falls

Uppermost concretionary bed is 1' below 10th H.L. step. This would make the Wandown about 57' thick.



Fauna between upper concretionary bed  
& coral bed

*D. inaequistrata*

*A. andacula* c

*A. reticularis* c

*A. decussata*

*P. rana*

Right common *Parastoechia*

*S. rectum* c

*Epidophyllina*

*R. varhensis*

*L. junia*

In the concretionary bed.

*A. spinosa*

*Trachypora*

*R. varhensis*

~~*A. decussata*~~

*A. reticularis*

*Genetella*

*D. inaequistrata*

~~*A.*~~

From RR at 579 to Gunculawa is 27 steps  
+ 24 ". This makes the lens 87 feet  
thick

27

137 135

11

148

61

87



August 1

Fossils seen in Ambrosia beds: -

<i>P. rana</i>	<i>T. annulus</i>
<i>A. sinuifrons</i>	<i>C. coronatus</i>
<i>S. planatus</i>	<i>C. setigerus</i>
<i>Schizodus clunensis</i>	<i>P. l. f. lunda</i>
<i>C. dictylus</i>	<i>Pterinopacten</i>

The Ambrosia bed terminates about 4' below the hard bed above the Atrypa bed. The zones on Fall Brook are probably an Ambrosia zone? An Atrypa zone 8-10"; An *A. praeumbona* zone 19" thick, and an Atrypa *Strophomena* zone, ~~with~~ 20' thick. In other words:

1. Ambrosia *praeumbona*
2. *A. spinosa* & *D. coracinus* - *A. reticularis* zone
3. *A. praeumbona*
4. Atrypa - *Spinifer* zone.

At the falls the fossils of the upper zone cease about 5 1/2' below the thickness and the upper beds are a darker shale with few fossils. The upper concretionary layer is blackish blue.

The top of the Hamilton here is at about 845' It is 40' below the road and about 80' below the house.

3  
845  
819  
26



~~24~~  
25  
~~26~~  
27

3

27  
5  

---

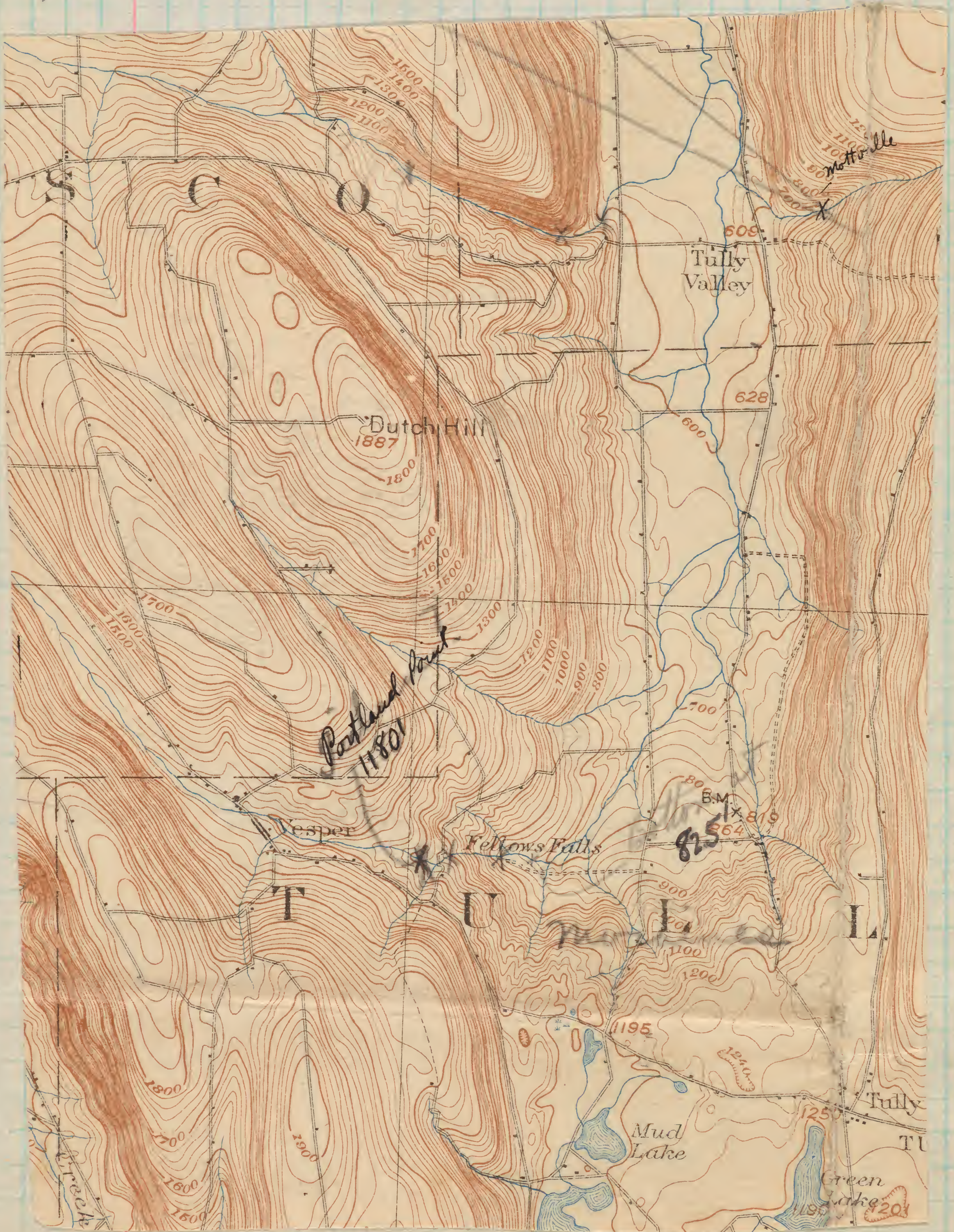
146  
11  

---

602  
748



35/a





is a river valley that lies between two  
and is the sea, with a bay that is partly  
and bar. On each side of the valley is  
small streams have cut narrow gullies.  
has a rounded summit and gently slop-  
ravines. The spurs are truncated at

## INTENTIONAL SIGNS

CULTURE  
(printed in black)



vic  
bad



Tunnel

## Wharves







August 22.

Fellows Falls

The hard band just below the coral bed contains *A. reticularis*, *C. recurva*, *C. conglobata*, *A. spiniferoides*, *C. recurva*, *S. granulosa*.

On the coral bed the shales have *C. bulliata*, *C. L. laura*, *C. spiniferoides* + *S. pinnatus* and look as if this were the bed. Faint graptolite zone of Cleland which passes into the first *Strophomena* zone with *S. demissa*.

The sandy (thin) beds are about 200 yds below the bed of road as indicated on the map.

Bear Mts.

Is the fauna of the shales with *S. pinnatus* below the hard band may be added *Pholidops hamiltoniae*.

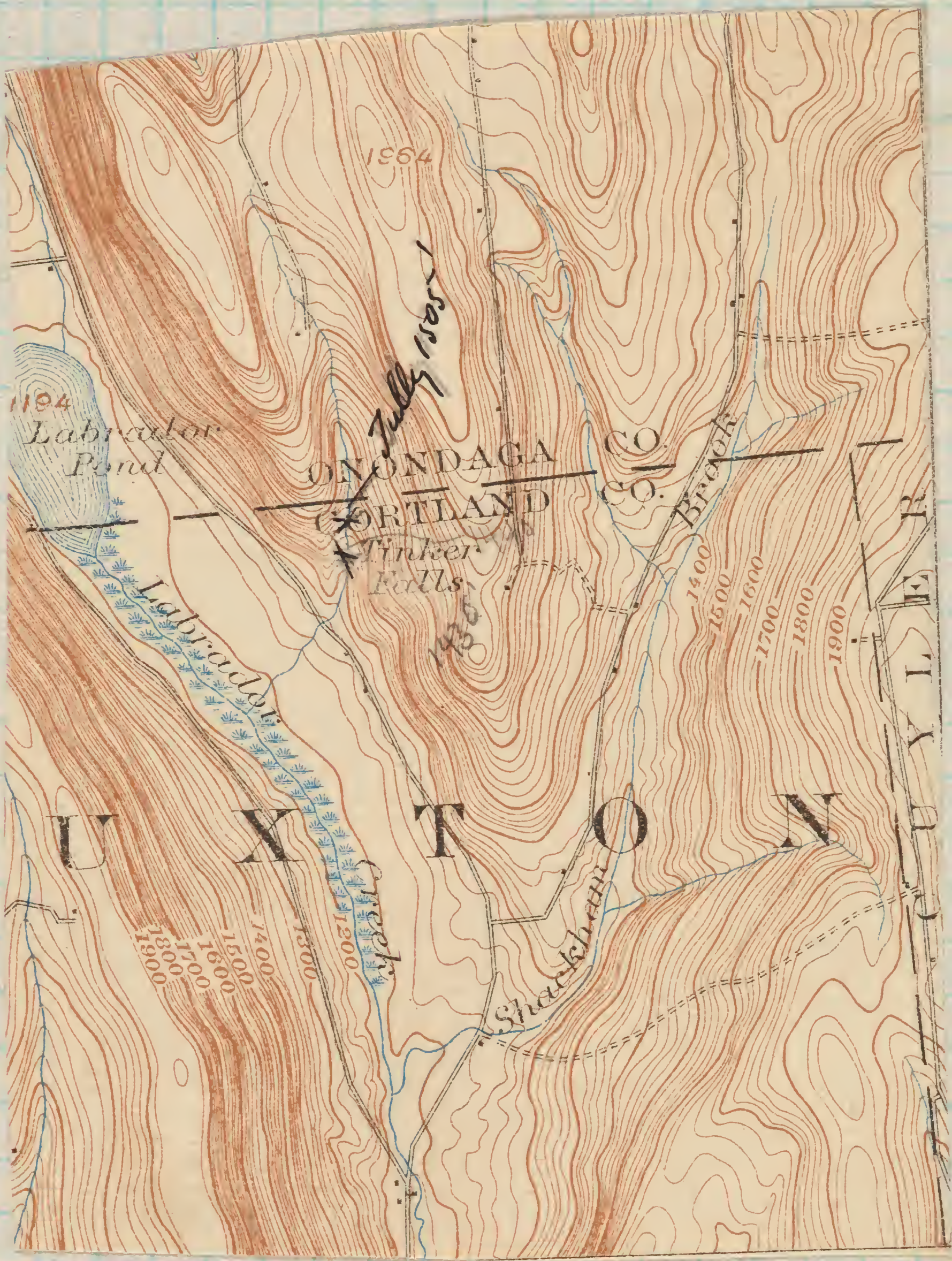
At 80-80 above the hard band in the *Cratopora* refs, *A. reticularis* occurs also *P. rhina*.

The *Cratopora* beds are about 6' thick. They also carry fenestellids and also massive *Bygonia*.

Fossils 5' above hard band  
*M. arguta*  
*A. princeps*.



352a





## Timbers Falls.

1 1/2 mi. NNE of Tuxton, Cortland Quad, N.Y.

At 445 paces upstream was seen a hard arenaceous band of a blue-gray color. This gave slight effervescence with acid. Fossils in it are: - *Spermaturus*, *C. umbonata*, *S. granulosa*, *R. variegatus*, *I. carinatus*, *E. blacklaeni*, *S. rugosa*, *S. crotalum*, *A. reticularis*, *S. tullius*, *A. asperus*, *S. chemungensis*, *S. macquistrate*, *S. perplanus*. The rock below for 1 1/2' is a softer shale.

At 525 paces rock is exposed in the stream. Here the following fossils were found: -

- |                        |                          |
|------------------------|--------------------------|
| <i>I. carinatus</i>    | <i>I. carinatus</i>      |
| <i>M. concentrica</i>  | <i>A. reticularis</i>    |
| <i>C. scitulus</i>     | <i>R. fimbriata</i>      |
| <i>P. rana</i>         | <i>Pal. concentrica</i>  |
| <i>S. granulosa</i>    | <i>C. mucronatus</i> c   |
| <i>P. rana</i>         | <i>M. pygmaea</i>        |
| <i>S. crotalum</i>     | <i>P. laevicollata</i>   |
| <i>S. permianus</i> c  | <i>Gonophora</i> sp.     |
| <i>C. bellistriata</i> | <i>M. oblongatus</i>     |
| <i>O. parvula</i>      | <i>Par. hamiltoniana</i> |
| <i>Cystodictya</i>     | <i>E. punctata</i> ?     |
| <i>Pholidops</i>       | <i>Cyrtolites</i>        |

This fauna is for the first 5' of rock exposed

1' above 5' i' comes a hard band about 3" thick which contains *S. lanna*, *M. subumbona* (or *A. <sup>m</sup>presumbona*), *S. tullius*, *C. mucronatus*, *R. variegatus*, *Pal. concentrica*, *A. reticularis*, *S. permianus*, *A. spiniferoides*. Just below the hard band the brittle shales have *S. lanna* and *S. tullius* c.c. also *I. carinatus*, *C. mucronatus*, *H. capillaria*, *M. <sup>m</sup>laevicollata*.



26  
3  
59

65



*M. bellistriata*.

The next 4 1/2' of shale are soft and break easily. They are also dark & contain *L. laura* c, *A. praenubona* ? c, *I. submarginata*, *M. oblongatus*.

The *A. praenubona* seems only to range for about 3'. The *Leiorhynchus* & *S. Tullius* are very large.

14'10" - 15'15" — same soft shales, with —  
*M. oblongatus*, *Pal. concentrica*, *A. spinifrons*,  
*M. suboblate*, *C. undata*, *S. hector*,  
*S. crotalum*, *R. vanuxemi*, *A. reticularis*,  
*L. laura*, *M. bellistriata*, *Phalidops*,  
*Pan. ham*, *Lox. sp.*, *Orthoceras* sp., *M. laura*

15'15" - 20'20" — few fossils & mostly covered.  
 20'20" - 25'25" — The shale at the top of this interval has concretions filled with snails, also *S. Tullius*, *M. finitima*,  
*R. vanuxemi*

25'25" - 30'30" — Blue grey shale with  
*C. scitulus*, *M. acis*, *M. leuciformis*,  
*I. curvatus*, *M. oblongatus*, *S. pennatus*,  
*Pan. laurifrons*, *M. trigonus*,

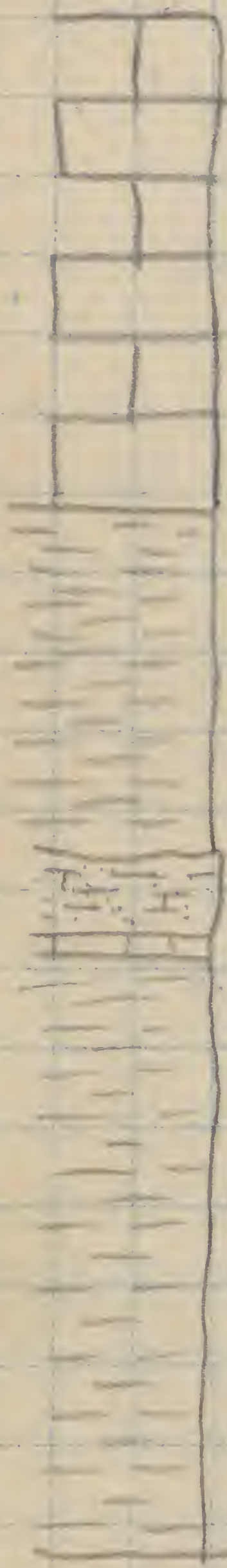
30'30" - 35'35" — Blue grey - pyrite - with  
*M. mytiloides*, *I. pennatus*, *Pal. concentrica*,  
*C. scitulus*

35'35" - 40'40" — blue grey shale

40'40" - 45'45" — same

45'45" - 50'50" — the blue grey shales in these intervals are quite sandy and fossils are abundant only in patches. Between 45'45" & 50'50" were noted *C. incisa*, *C. bellistriata*, *Trigula* sp., *Pal. constricta* etc.





Tully

Each square 5'

21' dark shale

21 8  
5  
11 8

coarse shale 5' 18"  
concretions band

Blue gray arenaceous shales. 33'

bottom of falls.



*L. orbiculatus*, *Emella* sp., ?, *P. minuta*,  
*A. goniatites*, *S. pennatus*.

At 50' 50" comes a hard layer of  
 large concretions, or more properly  
 concretionary ls. In places the ls. is  
 shaly but there are concretionary  
 concentrations of pure ls. This  
 contains abundance of *T. erimatus*.

On this (50' 50" - 55' 55") comes 5' 8" of  
 hard grey-blue sandy shale. It contains  
*A. spiriferoides*, small black concretions.

55' 55" - 60' 60" - On this come very  
 dark argillaceous shales which  
 continue to the base of the Tully.  
 This shale is almost black, breaks into  
 small flakes, and has practically no  
 grit. It is in marked contrast to  
 the lighter shales below. Fauna of  
 1st 5' of dark shales: -

- |                              |                       |
|------------------------------|-----------------------|
| ✓ <i>S. pennatus</i> (large) | ✓ <i>V. pustulosa</i> |
| ✓ <i>M. corbuliformis</i>    | <i>M. pygmaea</i>     |
| ✓ <i>L. laura</i>            | <i>Pal. antiquata</i> |
| ✓ <i>C. setigenus</i>        | <i>N. oblongatus</i>  |
| ✓ <i>C. mucronatus</i>       | <i>C. biorthus</i>    |
| ✓ <i>C. lepidus</i>          |                       |

There are 21' 8" of these dark shales  
 but only the first 4 or five feet and  
 the last 5' are accessible for collecting.  
 Fossils of the last 5' 5" are:

- |                            |                             |
|----------------------------|-----------------------------|
| <i>N. varcosa</i>          | <i>C. bellistriata</i>      |
| ✓ <i>S. pennatus</i>       | ✓ <i>C. incisurata</i>      |
| ✓ <i>V. pustulosa</i>      | <i>P. rara</i>              |
| <i>F. nestellii</i>        | <i>A. reticulatus</i>       |
| ✓ <i>R. fimbriata</i>      | <i>T. erimatus</i>          |
| ✓ <i>T. ludaculus</i>      | <i>C. complanatus</i>       |
| ✓ <i>A. spiriferoides</i>  | <i>L. laura</i> does not go |
| is confined to the last 5' | up to the base of Tully but |



The shale here is transitional with the Jolly.

There is no sharp line here between the Moscow and the Jolly except one of weathering. At the line where the fossil shales are in contact with the calcareous shales of the lower Jolly there is a brown stain from weathering about 6" wide which follows the contact. On the dark Moscow comes a dark calcareous shale for three or 4 feet just above the first step of the Jolly the rock was a hard brittle ls. The ls. forming the brink of the falls is flaggy and breaks into large slabs. This gives the whole mass the appearance of some of the weathered, slabby sandstone masses of the Hamilton. A peculiar reticulated *Obolites* was found in the shaley ls. at the contact. I make the Jolly here 31-32' thick (est.)



Bucktail Ravine  
Spafford Valley

At the bottom of the ravine just upstream from the highway bridge are found sandy shales that become hard and form a 20 or 25' falls. In the lower part these sandy shales contain *M. subalata* + *L. luma*. Somewhat higher up and about 15' below the brink of the falls *P. flabellum* was common. *M. pygmaea* was also noted. These shales have the look of the Red Gate horizon or U. Quarry? On the brink of the 1st falls were noted *Schuchertella* c, *J. cuneatus*, *Camarotoechia* sp.

4 steps above the falls there is a hiatus, then comes dark slightly sandy shales abounding in *Thomomys* and other fossils as follows:-

<i>S. ellipticus</i>	<i>J. cuneatus</i>
✓ <i>S. chemungensis</i>	Crinoid stems
<i>S. pennatus</i>	<i>Bugozya</i> (massive)
✓ <i>C. vicinus</i>	✓ <i>C. scutellus</i>
<i>S. perversa</i>	<i>P. rana</i>
<i>C. bellistriata</i>	<i>Aviculopecten</i> sp.

8 steps above the first falls is a small cascade over very hard ss. layers which has the following:-

<i>S. pennatus</i>	<i>S. grapholus</i>
<i>P. decussata</i>	<i>A. spiriferoides</i>
<i>Camarotoechia</i> sp. ?	<i>J. cuneatus</i>
<i>N. concinna</i> ?	

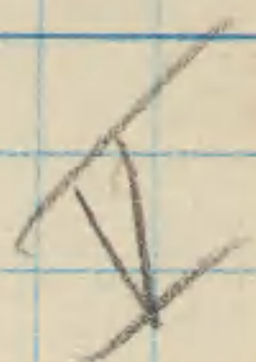
8-18 steps - hiatus

At the 18th step come coarse discolored shales, probably blue-gray when fresh with an unusual fauna. They have:-



- ✓ *S. demissa* c
- ✓ *S. concava*
- ✓ *A. spiriferoides* c
- ✓ *S. perplana*
- ✓ *T. carinatus* re

- ✓ *S. pinnatus* cc
- ✓ *A. reticularis*
- B. leda*



Between 19 + 20 steps the following species are recorded in a dark slightly sandy shale:—

- ✓ *S. pinnatus* cc
- ✓ *A. spiriferoides* c
- ✓ *M. oblongatus*
- ✓ *M. lirata*
- ✓ *Pal. femurda*
- ✓ *S. concava*
- ✓ *S. mucronatus*
- A. decussata*
- ✓ *S. granulatus*
- ✓ *Pal. maxima*

- Buchiola?*
- A. princeps*
- ✓ *R. vanuxemi*
- P. flabellum?*
- ✓ *S. demissa*
- ✓ *C. bellistriata*
- Small coral.*
- ✓ *S. perplana*
- ✓ *T. carinatus*
- ✓ *Pal. constricta*

At 23 steps comes a falls 15 or 20' high composed of hard sandy shales that break into large slabs which are difficult of fracture along the bedding plane. In these were noted

- ✓ *T. carinatus*
- Pal. emarginata*
- C. elongata*
- ✓ *S. perplana*
- ✓ *S. pinnatus* cc
- Cyp. tenuistriata*
- M. mytiloides*
- S. tullius*
- Pal. concentrica*
- A. spiriferoides*
- Orthoceras sp.*

In slabs lying under the falls *P. flabellum* is very abundant. Other fossils noted in the slabs are:

- P. ranch*
- O. bebrys*
- M. concentrica*

The falls is caused by a hard band with *S. concava*, *T. carinatus*, *Schuchertella* sp., *C. mucronatus*, *P. iowensis*, *P. flabellum*, *R. vanuxemi*.



*Camerozoechia* sp, *S. perplana*, *Crinoid* stems. This band is quite calcareous but is not directly on the brink of the falls but is about 19" to a foot thick and as upstream about 125'

On this hard band come softer shales with abundant fossils:-

- |                            |                          |
|----------------------------|--------------------------|
| ✓ <i>P. radiata</i> c      | <i>Pal. constructa</i>   |
| ✓ <i>S. pennatus</i> cc    | ✓ <i>M. concentrica</i>  |
| <i>B. leda</i>             | ✓ <i>C. scitulus</i>     |
| ✓ <i>M. pygmaea</i>        | ✓ <i>C. bellistriata</i> |
| ✓ <i>N. globuliformis</i>  | ✓ <i>N. lirata</i>       |
| ✓ <i>N. triquetra</i>      | ✓ <i>I. carinatus</i>    |
| ✓ <i>Pal. tenuistriata</i> | ✓ <i>S. perplana</i>     |
| ✓ <i>A. spiriferoides</i>  | ✓ <i>Trigloa</i> sp.     |
| <i>Gummysia</i> sp.        | <i>Orthoceras</i> sp.    |
| <i>B. arcuata</i>          |                          |

This layer at least in its lower part is characterized by the great abundance of *P. radiata*.

Another falls comes about 25' above the 27<sup>th</sup> step and here there is an overhanging shelf that allows examination of the shale just under the falls. It is dark grey and sandy. The following species were seen in it:-

- |                             |                          |
|-----------------------------|--------------------------|
| ✓ <i>C. bellistriata</i>    | ✓ <i>N. bellistriata</i> |
| ✓ <i>I. carinatus</i>       | ✓ <i>S. granulosa</i>    |
| <i>Protolopododendron</i> ? | ✓ <i>P. globellum</i>    |
| ✓ <i>S. pennatus</i>        | ✓ <i>M. concentrica</i>  |
| <i>N. dekeyi</i>            | ✓ <i>M. mytiloides</i>   |
| <i>Cyclonema</i> sp.        |                          |

The top of this falls is 160-160 and then comes another about 8 or 10' high. At 32+3 the rock is a hard sandy shale with the fauna given above. Then comes softer shale for 4' but they soon become sandy and heavy again to produce the cascade above.



the overhanging falls at 160-160.  
Fossils in this cascade are:-

On the lower part  
*S. pennatus*! cc  
*M. concentrica*  
*Pal. hamiltoniae*  
*A. erectum*  
*A. spiriferoides*

II

On the upper part - which is sandy  
*S. denizens* *S. pennatus*  
*M. concentrica* *C. princeps*  
*S. perplana* *S. perperca*  
*A. spiriferoides*

At 34 (170-170-1) comes the top of the cascade above the overhanging falls. This is succeeded by still another cascade. The top here is somewhat calcareous and produces the cascade.

At 35 comes another cascade about 20' high. Here from 34 to the top of it are blue grey shales. The fauna could not be examined as there was not good place for collecting. The following were noted however:-

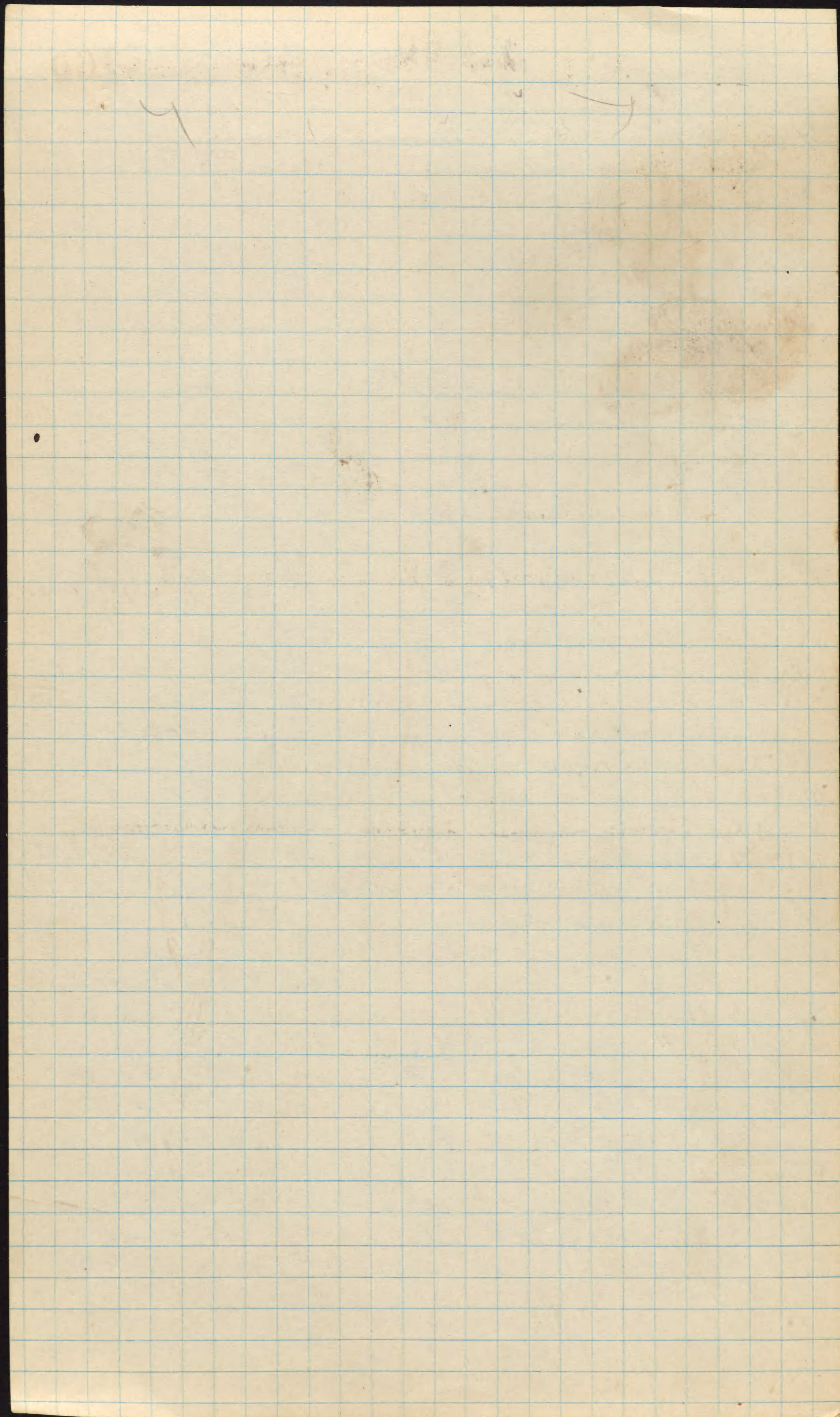
*N. oblongatus*  
*S. granulatus*

*J. corinatus*  
*C. scitulus*  
*Pal. concentrica*

I

The hard band forming this cascade is 28" thick. The 37th step came at the bottom of the hard band & is hard & areaceous for 14" but quite calcareous for the other 14". Both layers give effervescence with acid. Above this is the shales are all blue grey and they go clear up to the Dully.







The first 5' of shales contain

*S. perplana* ✓ *R. vancouveri*  
*T. kamatus* ✓ *P. fecunda*  
*P. rana* ✓ *T. carinatus*  
*C. bellistriata*  
*S. pennatus* ✓  
*S. granulatus* ✓

At 5' 15" there is a calcareous band  
*M. mytiloides*, *A. spiriferoides*

At 10' 10" *T. carinatus* is common.  
*N. triquetra* *S. pennatus*  
*Pal. concentrica* *S. tullius*

The shale between 10' 10" & 15' 15"  
 is somewhat more massive  
 than that below. Half way between  
 15' 15" & 20-20 there is a thin  
 calcareous band.

At 30-30 *A. umbonata* *P. rana*  
 ✓ *C. scitulus* ✓ *S. pennatus* ✓ *C. mucronatus*  
 ✓ *Pgl. plana* ✓ *C. bellistriata*, *P. rana*  
*S. perplana*  
 35-35- ✓ *C. lepidus* c, *A. umbonata*,  
*C. scitulus*

Between 35-35 & 40-40 *Chonetes* and  
*Amboclia* are still prominent.

At 40-40 we have *A. spiriferoides*  
 ✓ *C. bellistriata*, ✓ *S. pennatus*, *A. umbonata*  
 ✓ *Pholidops harringtoniae*, *P. rana*,  
*C. brothi*, ✓ *C. mucronatus*, ✓ *S. pennatus*  
 ✓ *Pal. emarginata*, ✓ *S. tullius*, *T. arcuata*

40-40 - 45-45 - same  
 at 50-50 - ✓ *C. coronatus*, ✓ *S. granulatus*  
 ✓ *A. spiriferoides*, ✓ *C. setigenus*, *A. umbonata*

(cc) At 55-55 - ✓ *R. vancouveri* ✓ *A. spiriferoides*  
 ✓ *C. incissus*, ✓ *R. fimbriata*, ✓ *B. alda*  
*P. harringtoniae*, ✓ *C. scitulus*, ✓ *S. perplana*,  
*S. rectum*. This is probably the  
 beginning of the *Strophodonta*-  
*coalline* zone.



Between 55-55 + 60-60 Pol. felunda,  
 ✓ H. liata, ✓ Pal. concentrica, Leptena sp,  
 ✓ T. carinatus, P. rana, ✓ L. brevicostis,  
 ✓ C. tenuicostatus Pal' emarginata,  
 ✓ A. reticularis, S. microristata c,  
 ✓ Bellinotata, ✓ L. sulcata, ✓ P. rana,  
 ✓ S. granulosa, S. aristata, ✓ C. coronatus,  
 Pal. humilithina, L. rectum, ✓ L. Tullis,  
 ✓ L. junia (L. concava?), L. perplena,  
 ✓ H. liata, ✓ T. carinatus, ✓ C. coronatus,

---

Between 70-70 and 75-75 —  
 ✓ A. serpens B. capillaria,  
 ✓ S. granulosa Pterinopactes sp,  
 ✓ A. spiniferoides ✓ M. concentrica  
 ✓ S. punctatus Belsa  
 ✓ M. pygmaea ✓ R. vancouver  
 ✓ Pal. concentrica ✓ A. reticularis  
 ✓ S. granulosa ✓ A. ang coral  
 ✓ R. fimbriata Schizodus sp,  
 C. lantia H. lantia  
 P. disordered Orthoceras sp  
 P. rana

---

These are probably in the M.  
 pygmaea zone.

Between 75-75 + 80-80 — Chaetetes sp,  
 P. rana, ✓ H. triquetra, ✓ P. muta,  
 ✓ C. setigerus cc,

80-80-85-85 — ✓ C. coronatus, cc, P. vancouver  
 Leptena sp, P. disordered, M. corbula  
 ✓ H. submarginata, ✓ H. triquetra, P. cyclops  
 Orthoceras sp

85-85 + 90-90 — shales more massive  
 breaking into lumps instead of  
 chips.  
 ✓ H. submarginata ✓ H. bellinotata  
 ✓ A. serpens ✓ A. undulata



✓ *M. varicosa*  
 ✓ *S. arcuata*  
 ✓ *M. oblongatus*  
 ✓ *M. concavatus*  
 ✓ *D. cuneatus*  
 ✓ *G. capillaria*  
 ✓ *P. discoides*  
 ✓ *Cyst. hamiltonensis*

✓ *C. scitulus* c  
 ✓ *C. setigerus*  
 ✓ *S. granulosa*  
*P. rana*  
 ✓ *S. nummulus*  
 ✓ *S. pinnatus*  
*A. tuberculatus*

90-95 — *P. patulus*

From 95-95-120-120 — hiatus. At 130' above the T occurs the falls with the Tully.

At 120-120-125-125 — the rock is hard and few fossils were noted in it.

*M. oblongatus*,

125-125-130-130 — *C. scitulus*, *C. concavatus*,  
*P. discoides*, partly covered

130-130-135-135 — shale heavy-bedded rather sandy — a reticulosis

*R. cyclos*, *U. sinuatus*, *S. granulosa*.

*S. concava*. This is for 135-135-140-140.

140-140-145-145 — The shale has become rather dark at about the middle of this interval and from

145-145-150-150 + 1/2' the shale is very dark and in places is mottled to a reddish color.

The height from the "Tulhew" to the bottom of the Tully is 163' by my hand level. These dark shales below the Tully are fine and like the Genesee.

In this dark shale were noted *S. tellus*, a small *Chonetes*, a snail, *D. cuneatus* and what appears to be *V. pustulosa*.



The following are recorded from a block of rather soft dark shale

<i>S. pennatus</i>	This block is probably from 8'-5" dark shale	<i>N. oblongatus</i>
<i>N. triquetus</i>		<i>S. erectostriatus</i>
<i>Avicullopecten</i> sp.		<i>S. perplana</i>
<i>Leioptelia</i> sp.		<i>P. discoidemum</i>
<i>L. laura</i>		<i>L. brevirostris</i>
<i>R. fimbriata</i>		<i>N. lirata</i>
<i>Pali. concentrica</i>		<i>P. tenuis</i>
<i>C. scutulus</i>		<i>S. nummulum</i>
<i>H. crumatus</i>		<i>L. rostellata</i>
<i>Pholidops</i> sp.		<i>O. bisuloides</i>
<i>T. carinatus</i>		<i>N. bellistriata</i>
<i>M. pygmaea</i>		<i>C. mucronatus</i>
<i>C. undulata</i>		<i>P. rana</i>
<i>J. submarginata</i>		

Fossils in the 1st 10' of Moscow

*B. leda*  
*T. carinatus* cc  
*S. pennatus* cc  
*S. arcuata*

A hard nodular ls band is at 5'-5" above T. The first 5' of rock is very hard and difficult to collect. This shale is rather sandy.

"Tichenor" - 2 layers each 1/2" thick containing many fossils. Below it a calcareous - areaceous band 1 1/2" thick.



At the highway bridge at Spafford Valley are 25 or 30' of rocks that are sandy shales below and become coarse and slabby at the top of the falls. The exact place of these shales in the section I cannot place, but it must be in the vicinity of the coral bed horizon 43' above the first falls come rather soft shales that bear *S. demissa* and *S. concava* in abundance. These should correlate with the rocks at the brink of the 2nd high falls in Fellows ravine. These shales become sandy and a hard band in them causes a falls, which should be the same as that on the sandstone layers at about 250-255 in Fellows Falls ravine. Then comes softer shales abounding in *P. radiata*, which become progressively sandier till they form a cascade, the water falling over a hard, slabby, heavy arenaceous rock. *H. dehaafi* was noted here and *P. flabellum* was common. There follows about 4' of softer shale succeeded by another hard band as was seen just below the road bridge at Fellows falls ravine. This shorter interval is followed by soft bluish gray shales that culminate in a 28" hard band, the upper 12 or 14" of which proves to be the Tichman. This then is the same sequence that was seen in the Fellows Falls ravine.

This ls. is not essentially the same as that noted in the Cayuga Lake section as it does not contain the great amount of corals debris seen at that place. It is light blue



grey in color and abounds in fossils. In one place the *Cephalon* and pygidium of *H. deflexi* was found in the rock.

On this limestone the shale is blue grey and rather hard for the first 5' 5" where a nodular band forms a cascade and 15' 15" above this another band band forms a cascade. I had difficulty collecting these beds, hence the lists are meager. *A. umbonata* comes in around 32' above the Tichenor and continues up to a point between 54 and 60' above the Tichenor. On this follows a zone with *S. rectum*, *Strophodontites* and *A. reticularis*, also *R. chrysocoma* in abundance. This zone continues for about 20-25'. Then come, in all probability, the shales of Cleland's *M. pygmaea* zone which is so well developed at Shurgen Glen. There is a 27' list in which the shales cannot be examined.

On the base of the falls, of which the Tully is the source, the shale is hard and practically no fossils could be collected from it. The only collecting done here was between 135-135 and 140-140 where *S. concava* was found. This fossil was found below the Tully in Cleland's *Spinifer-Atrypa* zone at Cayuga. At about 155' above the Tully the shale becomes dark colored, fissile and much like the Senessee up to the base of the Tully, about 8' in all. The dark shales carried *S. carinata* and *S. tullyi*. The Moscow section is essentially the same as that seen in Shurgen Glen.



$$\begin{array}{r} 37 \\ \hline 175 \\ \hline 163 \\ \hline 338 \\ \hline 15 \\ \hline 353 \end{array}$$



August 20.

## Fellows Falls.

The first rock encountered was that about 3 or 400 yards below the falls. It was a very sandy rock, a shale as it is thin bedded and is the same kind as exposed in the upper part of the Boonville ravine.

Rock exposed practically at the end of the railway works road and forming a low cascade at the bottom of the falls is a rather soft dark shale with *P. fragilis*, *L. laura*, *H. subulata*, *H. triquetra*.

At a step this stone is decidedly sandy; at 3 it had *L. laura* and *P. fragilis* in abundance.

The rock 24' above the first stone exposed is hard and sandy shale but contains *L. laura* in some abundance.

32' up - *P. fragilis*, *L. laura*, *H. triquetra*. Between 45-45 & 50-50 the same fauna exists but also with *C. setigerus*.

At 55-55-60-60 were found *L. laura*, *H. triquetra*, *L. curtum*, *D. pennatus*, *Prodictella* sp. *spinulicosta*.

Between 60-60 and 65-65 the rock is coarse and is like our rocks in Madison Co. just below the 'Lidlowville'. Here were recorded: *D. pennatus*, long winged and ornate, *Hypoceras* sp., *L. laura*, *H. actis*, *P. fragilis*, *Chonetella* sp., *C. brachy*, *Orthoceras* sp., *G. capillaris*, *H. lirata*, *C. cf. tenuistriata*.

65-65-70-70 the shale is hard, massive sandy, gives no appearance except in the fossils or on a bruised surface.



130

140

141

97.6

43.6

90  
7 6  
97 6

130  
11  
~~141~~  
98  
43

90  
98

130  
98  
42



Between 70-70 and 75-75 the rocks become very calcareous and have a few cup corals and Forssites. This is also the very brink of the falls.

Above the brink of the falls were seen 9 or 10' of sandstones, rather heavy-bedded but ones that split into heavy slabs. These ss. have occasional large spherical concretions. The only fossils noted in the beds here are:

*C. incisurata* ?, *P. flabellum*, *I. carinatus*, *S. perplana*, *C. mucronatus*, *Cyrt. hamiltoni*, *A. decussata*.

At 90-90 the ss are succeeded by a softer shale abounding in fossils. The shale for 1 1/2' is rather hard and somewhat more massive than that above.

Fossils are:-

- |                               |                             |
|-------------------------------|-----------------------------|
| ✓ <i>S. pennatus</i> re       | ✓ <i>C. corrugata</i>       |
| ✓ <i>I. carinatus</i> cc      | ✓ <i>S. andaculus</i> re    |
| ✓ <i>S. perplana</i> c        | ✓ <i>S. divaricatus</i> re  |
| <i>P. brana</i> re            | ✓ <i>R. vanuxemi</i> c      |
| ✓ <i>C. vicinus</i> re        | ✓ <i>A. reticulatus</i> c   |
| ✓ <i>Pas. hamiltoni</i> re    | ✓ <i>A. spiniferoides</i> c |
| ✓ <i>S. inaequistriata</i> re | ✓ <i>C. retigens</i>        |
| ✓ <i>C. constrictus</i> re    | ✓ <i>S. gradiculus</i> re   |
| ✓ <i>R. fimbriata</i> re      | <i>P. stylipora</i> re      |
| ✓ <i>C. mucronatus</i> re     | <i>A. chinii</i> re         |
| ✓ <i>M. concentrica</i> re    | ✓ <i>D. sculptilis</i> re   |
| ✓ <i>A. decussata</i> re      | ✓ <i>Cran. hamiltoniae</i>  |
| ✓ <i>M. perruana</i> re       | ✓ <i>Gon. truncata</i>      |
| ✓ <i>Calidrotachia</i> 2 sp.  | ✓ <i>C. indenta</i>         |
| <i>Charites</i> sp.           | <i>S. solenoides</i> ?      |
|                               | ✓ <i>Fenestellids</i>       |

The abundance of *S. divaricatus* here is very striking.



90-90-95-95 — in the stream bottom the same shales with bands composed almost entirely of *C. scitulus*. Also *C. complanata* and *Anculopecten* were noted here.

From 95-95-110-110 the rock and fauna are the same but above 110 to just below the falls fossils become less and less. However *S. pinnatus*, *A. reticularis*, and *C. scitulus* were observed abundantly to within 8 or 10' of the bottom of the falls. Other species observed are: — *S. perversus*, *Orthis* sp. & a large *Strophodont*.

At the top of the falls which is at 130-130 comes the coral reef of the Ludlowville. This 20' fall is caused by a hard sandy layer that contains *S. pinnatus*, *A. princeps*, *C. boothi*. This hard sandstone band is 3 or 4" thick and culminates the shales that contained *S. divaricata* & *A. reticularis* in such large numbers.

The coral bed is between 6 1/2' and 7 1/2' thick. It consists of a dark, rather soft shale in which the corals abound. *Zophrentes* and *Cystiphyllum* are the commonest genera.

The shales on the coral bed are a blue gray like our Earlville shales and abound in *C. bellictrata*. Other fossils noted were: —

*M. subalata*

*N. triqueter*

*L. laura*

*B. ledum*

*C. bellictrata*

*N. corbuliformis*

*N. oblongatus*

*Opteroceus* sp.

*Pal. constricta*



Right near the coral bed *A. spiniferoides* and *S. pennatus* were noted. A horizon with *C. bellistriata* and *L. denisa* was found in the middle of the 100' falls at Essmore. The *Cypicardella*s come from about 15 or 20' above the coral bed.

At 190-190 the shales do not seem to be very fossiliferous and few forms were observed:-

*C. boothi*

✓ *S. pennatus*

*N. oblongatus*

✓ *L. denisa*

These are in a dark blue somewhat sandy shale.

Between 200-200 + 205-205 the following were seen:

✓ *A. spiniferoides*

*N. brista*

✓ *S. perplena*

*N. oblongatus*

80 21 *N. concinna* 230 205 21

*B. fida*

*C. boothi*

✓ *S. pennatus*

Between 205-205 + 210-210 - the following were seen:-

*R. cyclos*

*A. spiniferoides*

✓ *G. enstella*

*N. concinna* c

✓ *R. vanuxemi*

✓ *S. granulosa*

✓ *S. pennatus*

✓ *Pal. constructa*

✓ *N. oblongatus*

*C. boothi*

✓ *A. small cupul*

✓ *S. concinna*

✓ *T. submarginata*

✓ *S. perversa*

✓ *L. elliptica*

✓ *L. denisa*

*S. aratistria*

*P. flabellum*

✓ *A. deniscata*

✓ *S. sinuatus*

The falls above the coral bed is fully 80' vertical. Beyond this is another smaller falls.



215-225-220-220 - coarse sandy heavily bedded shales with *Sacculites*,  
*P. flabellum*, *I. cuneatus*, *C. bellistriata*,  
 long winged *I. pennatus*, *M. concentrica*,  
*Pal. costata*, *N. oblongatus*, *C. cf.*  
*stolpica*.

220-220-230-230 - coarse shales breaking into large slabs. They have a prolific fauna -

<i>P. flabellum</i>	<i>S. granulosa</i>
<i>I. cuneatus</i> cc	<i>M. concentrica</i>
<i>C. coronatus</i>	<i>A. spiniferoides</i>
<i>S. pennatus</i> cc	
<i>Pal. emarginata</i>	

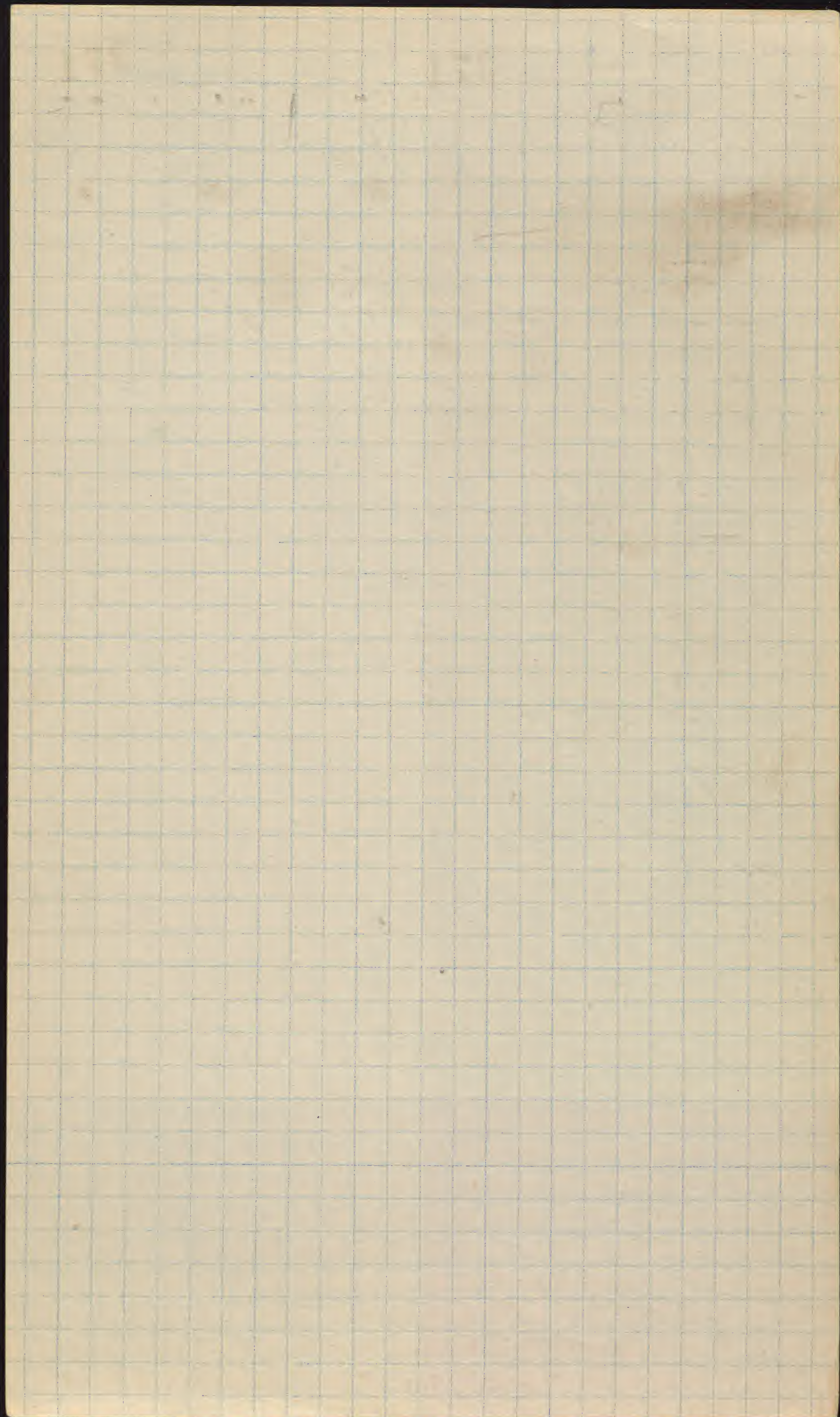
The *S. pennatus* are very large indeed. The bed forming the first corallite here is not only sandy but is calcareous.

Between 230-230 + 235-235 the rock is hard, sandy and breaks in large slabs. There were found *S. pennatus*, *S. pumila*, *Trigula* sp., *Fenestellid* and the planoroid of an *H. dekeri*.

At 250-250-250 comes an exceedingly hard band about 1'-15" thick. It has fossils, *Spinifer* & *I. cuneatus*. On this come dark soft shales. The sandy beds are 4' thick from the *Strophodont* beds. However there are probably 15' of shaly ss beds and thus making 25 or 30' of ss.

The blue grey shales and sandstones contain the following fossils - *I. cuneatus* cc, *N. oblongatus*, *C. scitulus*, *C. setigerus*, *S. pumila*, *Pal. concentrica*, *N. linearis*, *N. varicosa*, *S. pennatus*, *M. concentrica*, *N. trigonatus*, *C. bellistriata*, *Pal. fucoida*.







*C. coronatus**Sonicopleura* sp.*A. spiriferoides**Aviculoplecter* sp.

A little higher up the shales become coarser and break into chunky fragments.

*P. flabellum**Pal. emarginata**S. granulosa**G. constata**M. mutiloides**N. oblongatus**A. princeps* ?*A. reticularis**S. blennioides*

*A. reticularis* was noted in a hard band at 255-255.

*P. flabellum* comes in at about 265 in these shales, where it is common and is associated with *Aviculoplecter*. Between 260-260 and 275-275 the shales become sandstones which are hard and break up into very large slabs. Fossils at 275-275 are *C. coronatus*, *I. caimatus*, *S. granulosa*.

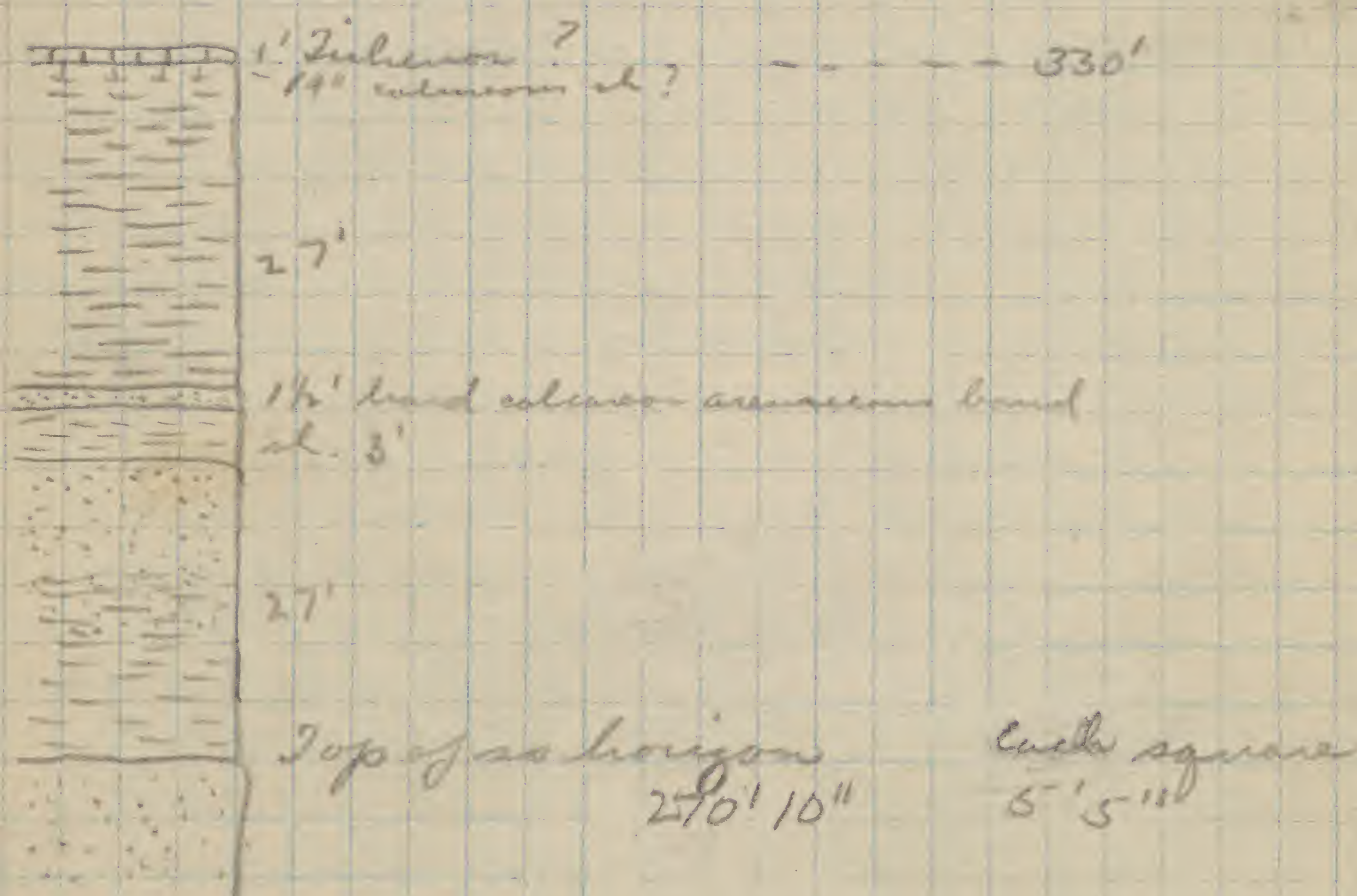
About 200 yds upstream from the highway crossing are 15' of dark blue grey shales with many fossils and on top of these a 26" band of hard blue grey ls. This may be the Tichenor and should on the map be west of the highway.

The bluish shales contain:-

*C. bellistriata* ✓*Par. hamiltoniae**S. perversa* ✓*A. erectum**Pal. constata* ✓*Par. hamiltoniae**S. granulosa* ✓*N. oblongatus**B. arcuata* ✓*M. concentrica* ✓*C. scutellus* ✓*Leiopteria* sp.*P. radiata* ✓*S. perrinites* ✓*M. bellistriata* ✓



Section at Falls below  
highway bridge + also west of it.





The ls crosses the stream in ~~an~~  
an 8 or 10' cascade 300 paces from  
the highway bridge. The rock is  
very fossiliferous and contains many  
Crimoid stems. It also has:-

*T. carinatus*

*S. pinnatus*

*C. scintillus*

At the falls the ls bed is about  
1' thick

The 300 paces upstream represents  
27' by level level.

at 280<sup>3</sup> - 280 + 2 comes the top of the rock  
below the highway. This makes a total  
of 303

The falls at the top under the bridge  
is caused by a hard calcareous ~~armor~~  
band in two layers 9" thick each.  
Below it are about 3' of dark bluish  
grey shales. This hard rock contained  
*S. pinnatus*. Two large slabs below  
the falls and probably from this  
horizon contain:-

*S. pinnatus*

*H. deflexa*

*T. carinatus*

*S. per plana*

*C. coronatus*

*S. cf. demissa* (?)

*A. princeps*

I believe on looking at the ss  
beds again that they begin as  
near as at 230-235 and go up to  
250-250 minus 2', and thus are about  
19 or 20' thick. They probably belong  
to the University Quarry horizon.

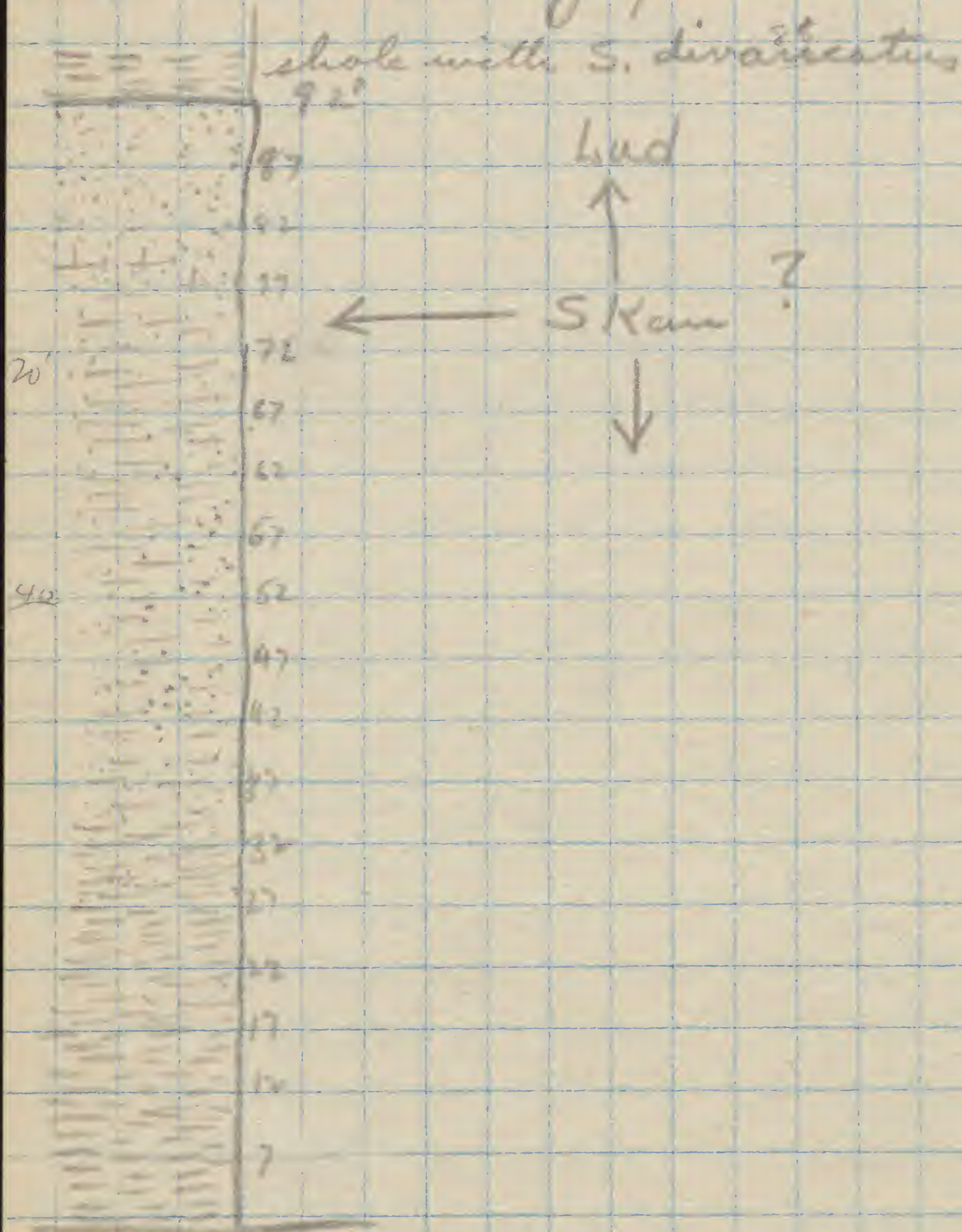
Below the ss are sand shales  
which continue down to the  
*Strophodonts* band at the top of  
the big falls above the coral



horizon. Below this to the coral beds the shale is less sandy and may belong to the lower *Biorhynchus* shale in Patterson's Glen or Randallville Gorge.

The shale with *S. denissau* and *C. bellistriata* continues to 225-225-230-230 as representatives were found here. Above this come the ss. which are shaly for 5 or 10' judging by their weathering, but become stony at around 235-235

### Section of first Falls





## Remarks on the Ludlowville

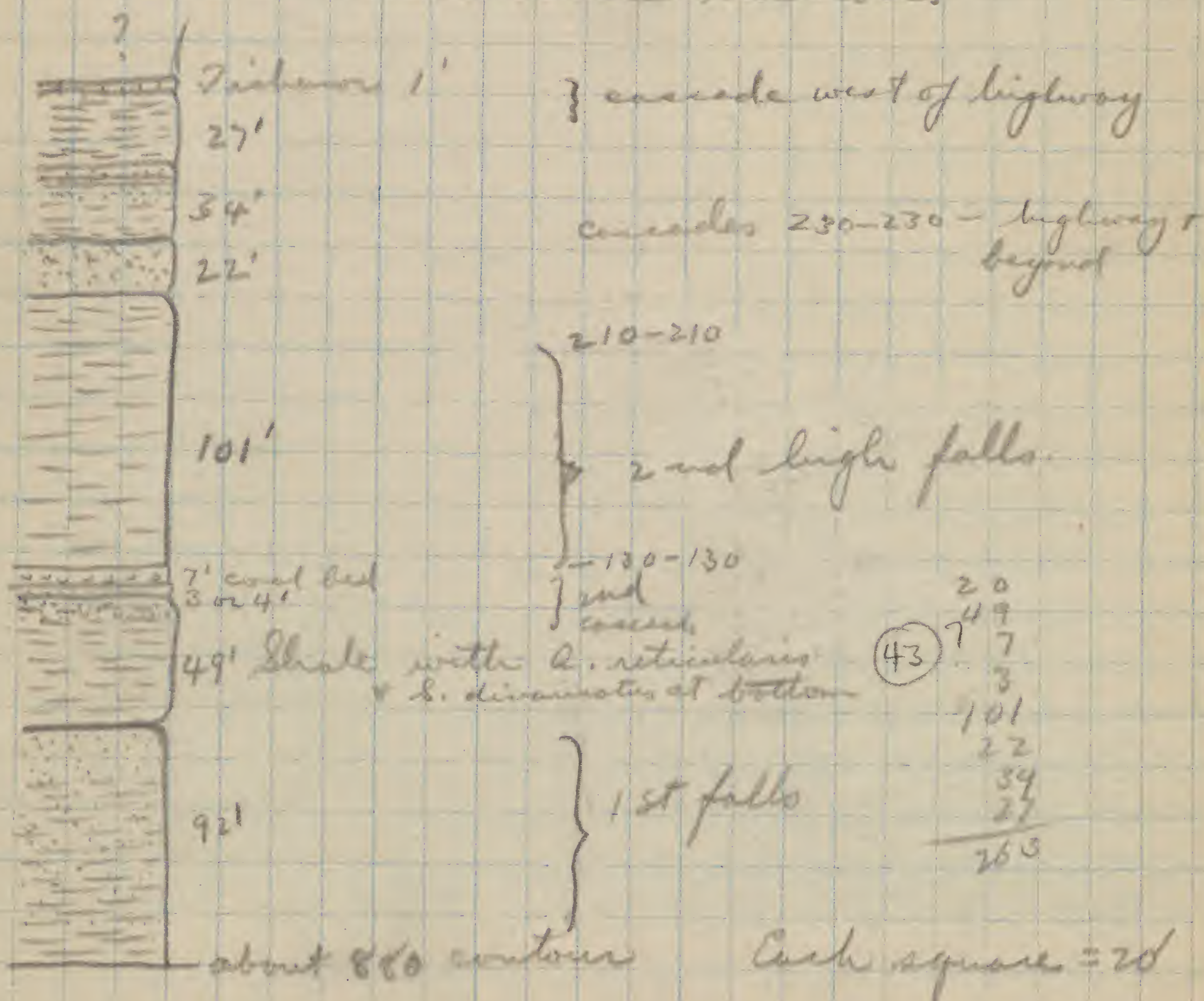
Before coming to the falls the sandy beds that break into thin layers and appear so much like fissile shales were noted. Then there is a hiatus until practically the end of the road is met. Actually the stream crosses the road, altho it is not indicated on the map, and just beyond the crossing are found dark soft shales, undoubtedly belonging to the Shannettites. There is a distinct "Shannettites of the west" aspect. The fauna continues as a typical *Leiorhynchus* fauna for about 65' from the bottom at the drill house where the first soft dark rocks were met. At this level *L. curtum* was found and with *L. gemmatus*, *P. lineata*, *S. capillaris* but also *L. lancea*. About 75' up the shale is a ss and continues so for 15' or 20'. At the base of this ss is where I believe the line should be drawn altho Luther does not say in his text just where the line is drawn. It is possible that it is drawn at the sandy beds below the dark Shan shales but this is not likely. No collecting could be done in the ss.

On the ss comes a soft shale abounding in *S. divaricatus* and other fossils. This may be where the Hyr quarry enters, if it is not Shannettites. Above this shale comes a hard band and then the coral bed. On the coral bed, which forms the base of the second large falls, the strata



1180  
870  
310

# Ludlowville section.





are blue gray and about 10' above the corals abundant in *C. bellistriata*. The fauna of this falls could not be examined except at the top & the bottom, as the face of it could not be scaled. On top of the falls *S. demissa*, & *S. concava* were found. This layer with *Cypinodollos* below & *Strophodontes* above is between 100 and 105' thick. On this comes about 20' of sandstone with spherical concretions & *P. flabellum* which are probably in the same horizon as the M. Anany and they look like that stone. Then comes a soft shale that passes into a sandstone, 32', on this soft shale again with a prolific fauna 27' and this is capped by a hard band of ls. a foot thick. This stone appears thicker downstream due to calcareous shale bands below.

This ls has not the look of the Tichenor elsewhere but has some of its fauna. It is the first stone which *Camartoceras* were seen in any abundance.

On Luther's map 230' of contours are represented in the Ludlowville. My measurement is 263' by hand level & is probably wrong. It is impossible to tell just where he drew his line. If it is where the *Strophodontes* below become sandy it would add 60 or 70' to the measurement.

*S. divaricata*, was only found in the lower 2 or 3' of the shale in which it occurs. A reticularis ranged up to 10 or so feet of the coral bed. There are difficulties in assigning this to the



New Gym horizon.

I noticed no beds with many *Camarotoechias* or small *Spirifers* as we have them in Madison Co. The zone with *E. linblaeni* was not seen, nor anything like the Centerfield ls, unless the beds with *S. divaricatus* and *A. reticularis* be it. The coral bed would properly go with the Centerfield equivalents, and the shale atop would go with the Patterson's glen fauna. It will be noted that in some ravines at Erieville *S. demissa* with a *Leiorhynchus* fauna was found. The Gym beds, and the Electric light stream horizon are still mysteries. I do not believe that they are shales for I have seen zones in the shales with *M. arguta*, large *Spirifers*, *P. luata* & others more commonly seen above

The beds from 250-255 minus 2 up to the "Tichenor" (?) I believe belong to the Red Gate horizon.



Sept 4,

About 2 miles S of Keeney on the opposite side of the Valley (East) is a quarry about 15' vertical in soft, dark blue-grey shales. The fauna indicate that the beds are in one of the Ambocoelia zones.

*C. lepidus**A. subornata* c*P. pinnata* c*C. boothi**D. undulata**C. mucronata**P. pinnata**R. fimbriata**M. subulata**N. trauera**S. perversa* c*P. pinnata**C. vicinus**P. lamellata**M. cuneata* c*S. acuta**P. discoides**R. vancouveri**C. bellistata* c*C. coronatus*

The rock crumbles easily into small irregular, chunky fragments.



August 23, 27.

Road between Jamesville + Manlius

Along the road about 2 miles East of Jamesville the Agoniatites was seen. It is here about 40" thick in 2 layers defined by weathering color. The lower layer is about 14" thick and is a limestone of very even, smooth texture with a <sup>sub</sup>vertical fracture. On the surface it weathers to a light ashen grey. The topmost layer is 26" thick and is much darker, with a rather blocky fracture and much scarred by horizontal and irregular cracks. This upper stone has also many orange rust spots in it. I also found most of the fossils in this layer. At the junction of the two layers small crinoid stems and tiny brachiopods were accumulated in places.

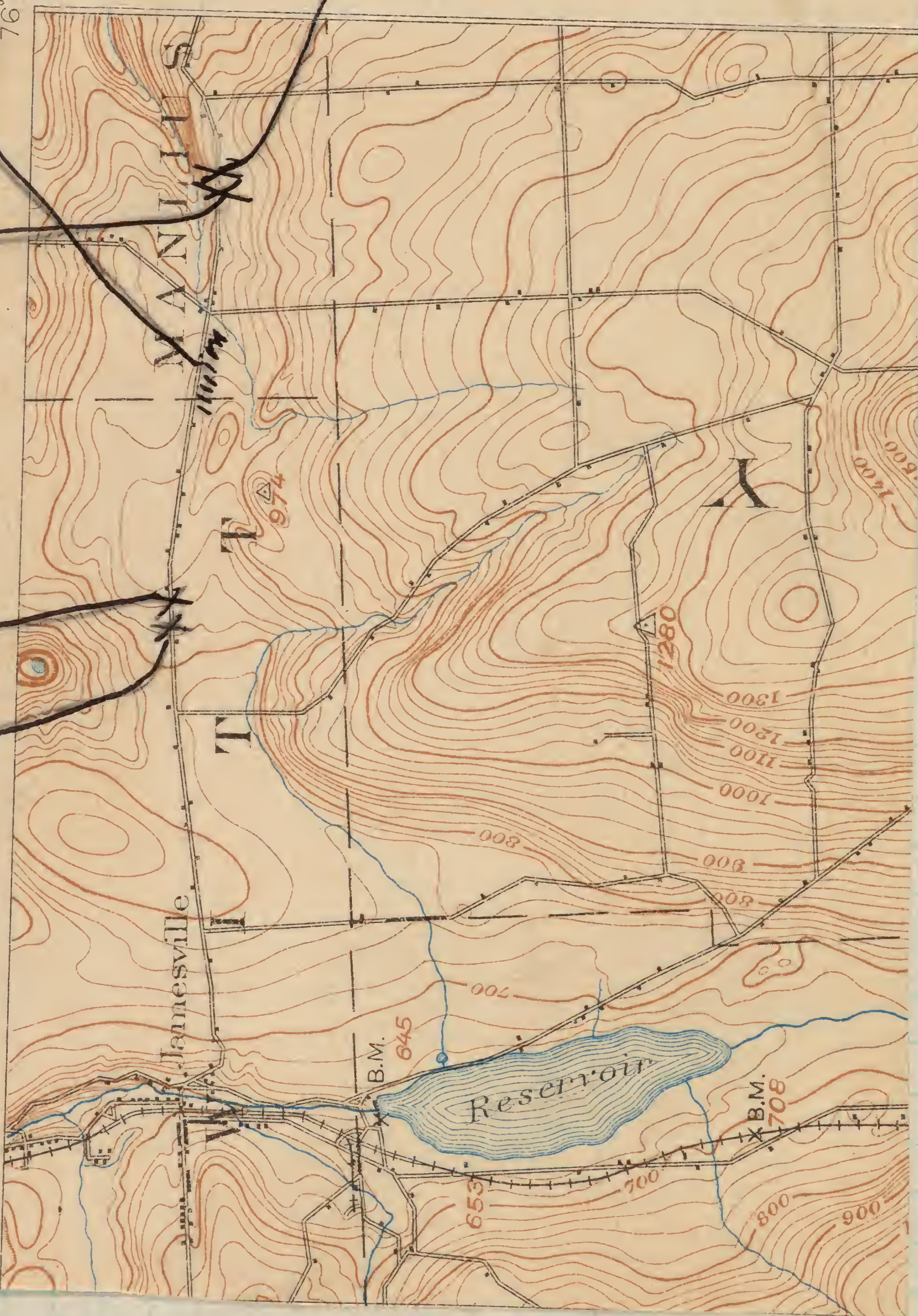
Between the Onondaga and the Agoniatites there are 2' 8" of black shale with some black ls. bands much as in Madison Co. This was measured by hand-level.

The upper surface is somewhat shaly & contains snails congregated in places & other small fossils. East of this exposure, which continues up the hill and forms the flat hill there, Upper Macedon shales are displayed and the hill about 1/2 mile east of Agoniatites outcrop. The shales here are the same as those on Onondaga Crk. They also have the peculiar pitted surface



379a

Onondaga  
NEW YORK  
TULLY QUADRANGLE  
Agoniatites  
Top of Onondaga  
Upper Maecellus  
(Chittenango)  
76° 00' 43" W





on small flakes. The Agoniatites  
fossils into ~~small~~ chunky irregular  
lumps.

Just east of the first road  
intersection east of the first Agoniatites  
outcrop noted and about  $3\frac{1}{2}$  miles  
east of Jamestown is another  
that exhibits most of the shale  
and ls. below the Agoniatites + on the  
Onondaga. The Onondaga may  
be seen in a small gully north  
of the road in the hollow between  
the Pompey road and the hill and  
just west of the yellow house at the  
foot of the hill.

The lower layer of the Agoniatites  
here 9" holds together in contrast to  
the upper layer which as here  
crumbled to bits. The weathering of  
the upper layer brings some of the  
fossils into relief. Cephalopods are  
not as abundant here as in the  
Onondaga ls. region.

*P. fragilis* was noted in the shale  
and ls. below.







Aug. 5

1978

Hills Gulch

Tichenor 550 paces upstream from highway

Sections at the falls:-

Lowest 5'5" - blue grey shale  
*S. pennatus* a.About 3' above stream-level is a calcareous  
bed about 4" thick this contains*M. hastensi**L. harr.**A. andacula**P. covenensis**P. patulus**A. decussata**C. coronatus**A. misononta**P. rana**M. concentrica**C. bellettrata**D. inaequistrata**S. capillaria**C. aculeus**S. pennatus**P. rana*

The next 6 1/2' shale becomes very fossiliferous

*Heliophyllum**D. inaequistrata**M. hastensi**L. perplena**A. misononta**P. gaultheriensis**A. princeps**P. oviformis*This shale is capped by 9-15 inches of  
hard brownish grey conoidal limestone



8" limestone Menteth

3' hard shale Deep Run

crinoid ls - 9-15"

6 1/2' shale with cup corals

calcareous bed 4"

shale 3'

stream level



The limestone is succeeded by hard blue shale that weathers to an ashen grey color. This shale contains:

Large crinoid columns.

*Bygonia*

*C. planirostra*

*P. rana*

*D. inaequistrata*

*N. concinna*

This shale, the Deep Run is 2 1/2 - 3' thick

*C. coronatus*

Menteth ls.

Fossils:-

*D. sculptus*

*Platyceras*

*Centropora* sp.

*P. rana*

*I. limbata*

*C. coronatus*

The uppermost layer of limestone is like the Menteth in every respect and is here separated from the massive Lichenon by 3' of brittle shale. The correlation of the Menteth as far as Bull's bridge therefore seems O.K.

Menteth 6-8'?

Above the Menteth comes a dark blue shale that weathers to a light blue. Upstream by the private road bridge it is crumbly and has large *I. carinatus* in it.

*C. vicinus*

*N. concinna*

*S. peremptus*

*C. boothi*

*I. limbata*

*P. rana*

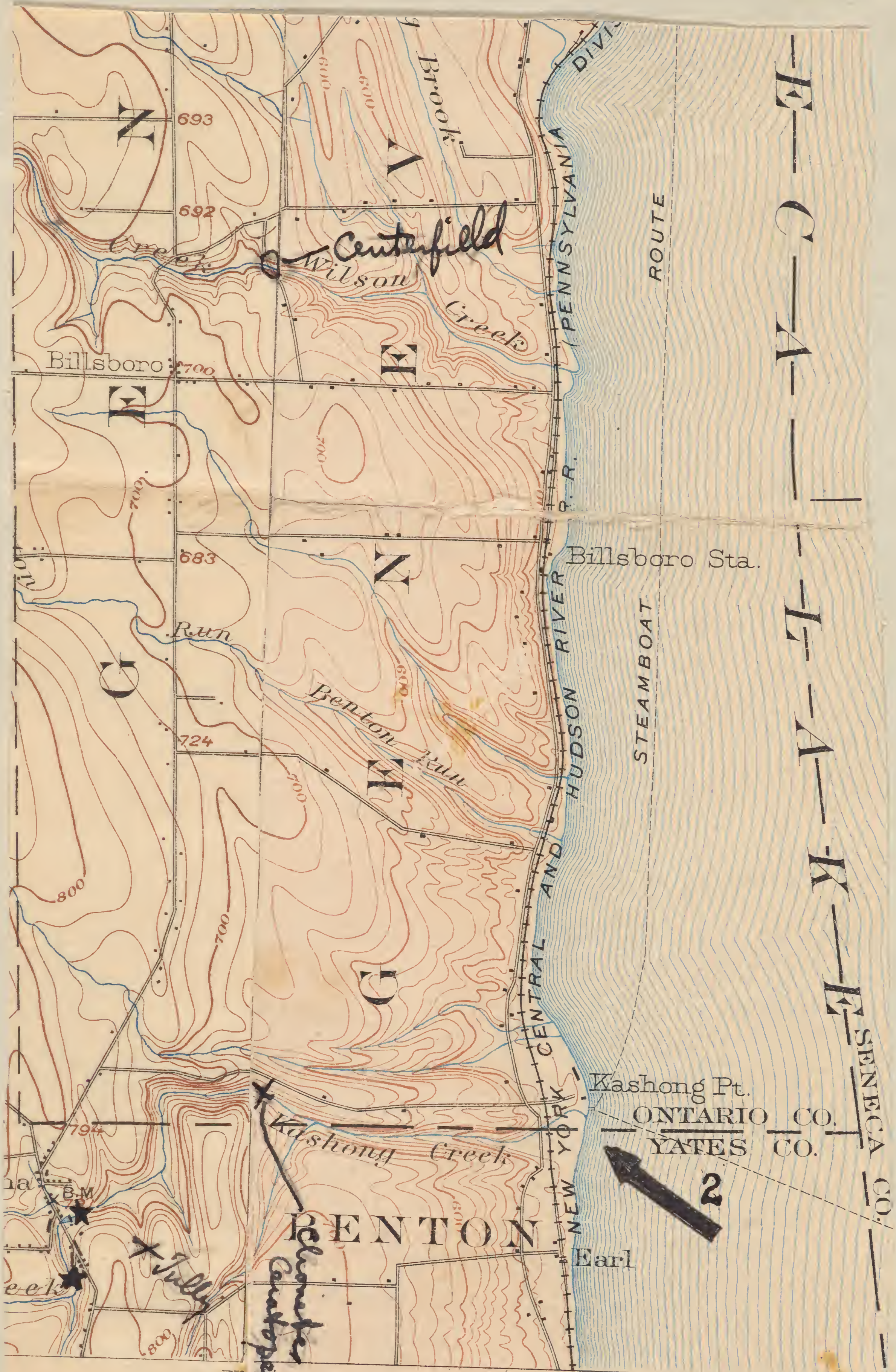
*Camarotoechia*

*P. rana*

*P. pavilionensis*



382a



printed 1923:

M. Wilson, Geographer in charge.

Control by W.T. Griswold and J.H. Wheat.

Topography by J.H. Jennings.

Surveyed in 1899 in cooperation with the State of New York.

PHELPS



August 7 1927

## Kashong Creek Section

460 paces from the highway bridge is to be found a small exposure of dark grey shales in the bed of the creek. These have a conchoidal fracture on the bedding-surface and are very slightly calcareous. These bear a very sparse fauna:-

*P. fragilis* c.*B. ledum* r.

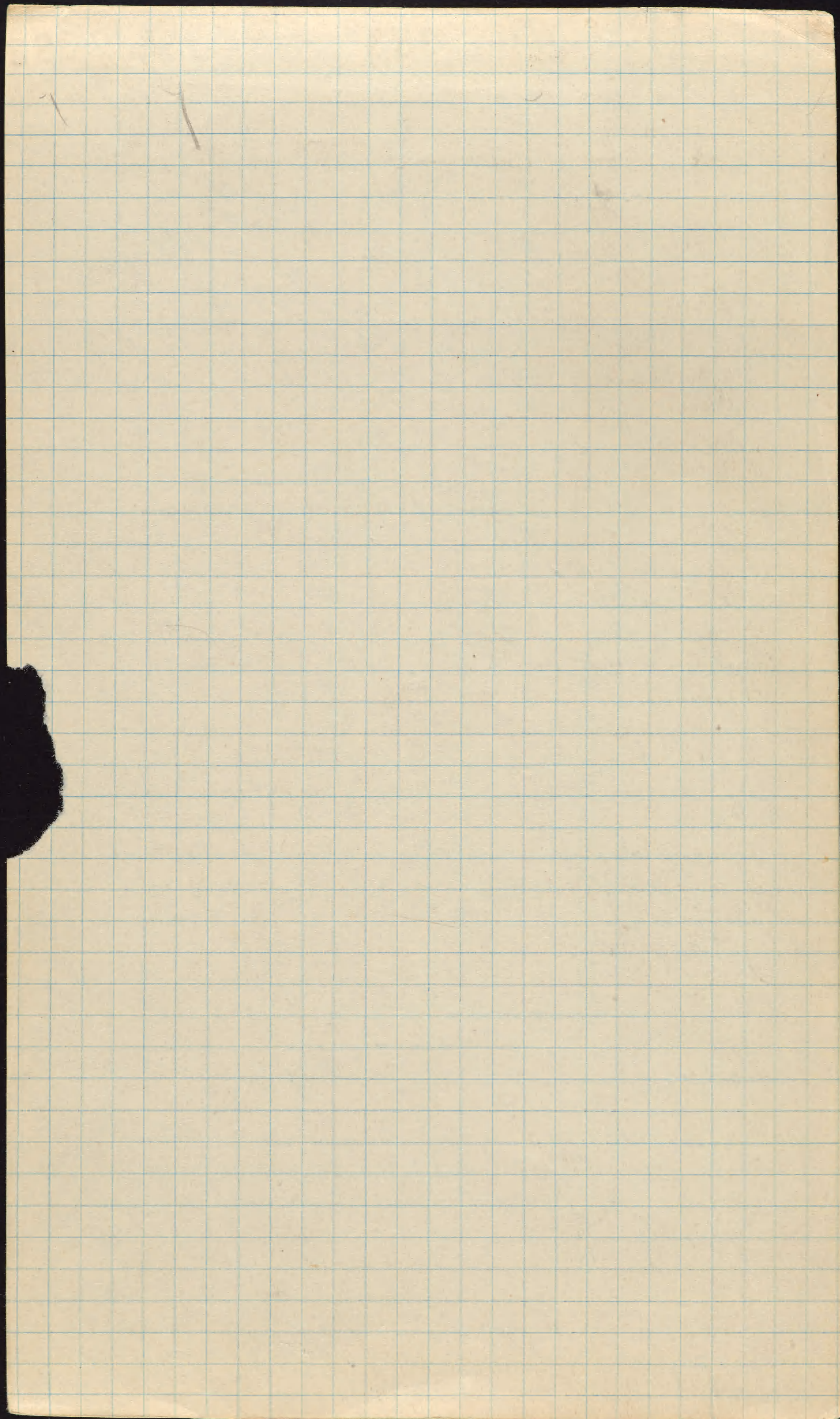
At 520 paces shales are revealed for about 10-15' vertically. These are dark blue-grey and carry the following fauna for 100' vertically

*D. truncata* r ✓*Parallelodon hum.* ✓*P. concentrica* c ✓*M. concentrica* ~ ✓*A. umbonata* ✓*Lox. hamiltonioid**S. truncata* ? ✓*Buchiola* sp.*A. spiniferoides* ✓*Orthoceras* sp.*P. stylopoda* ✓*C. bellistriata* c*C. boottii* c*P. rana* r*C. setigerus* ✓*C. lepidus**S. pectinatus* r*Scapillaria**Camartoechia* sp.*S. rectum* ✓*S. perplana* ✓

This bed also contains many concretions.

Between 700-800 paces there is a bank of shale that is easily 60-70' vertical. The shale is very dark, almost black, fissile and much jointed. It is an easy matter to take large blocks and with one blow shatter them into a mass of flatish chips. The shale in places is fissile breaking into paper thin flakes. Between the joint planes and along the bedding seams small







gypsum crystals have been deposited. Fossils are very rare at least in the lower 10' only which were examined. Here were noted

*S. fissurella*

*P. fragilis*

In the stream bed large irregularly rounded oval, or elongate concretions of  $\text{CaCO}_3$  protect the shales from the weather and the wear of the water. Pyrite concretions are also present here.

Between 972 and 1030 paces these same shales are exposed in a steep bank. Here additional fossils were seen:-

*S. truncata*

*Orthoceras* sp.

*E. regulata* ?

*M. triquetra*

*I. submarginata*

*B. retrostria*

*Pterinospecten* sp.

At 1200-1275 paces is another exposure of these very dark fissile shales. Their appearance is like the Skaneateles shales. At this exposure the fossils noted are

*A. umbonata*

*B. ledus*

*Buchiola*

*I. submarginata*

At 1030 paces in some spherical concretions there were many *Loxonemas*.

The fauna in the bed <sup>45' up</sup> of the stream from 1400-1450 paces follows:-

*S. pennatus* c

*P. stylopoda* v r

*C. boothi* c

*Pal. concentrica* c

*C. bellistriata*

*Par. hamiltoni*

*A. umbonata* c

*P. rana* r

*Pal. fecunda*

*M. corbuliformis*

*Spirifer* sp. ?

*O. parvula*

*S. rectum*

*C. scitulus*

*P. discordum*

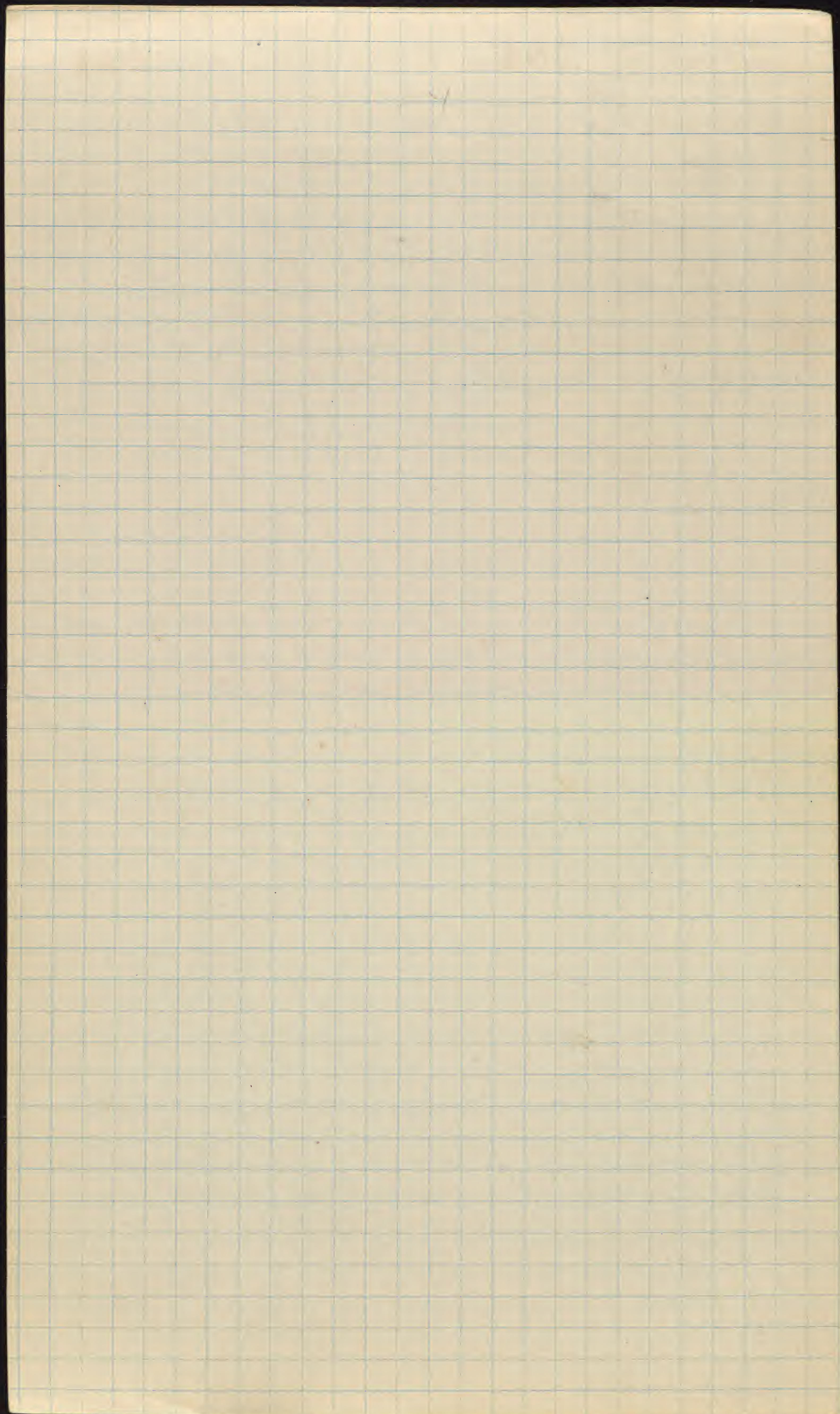
*M. liata*

*Orbiculoidea* sp.

Ostracoda

This fauna and the rocks are the same as those seen at 520 paces. This is either a recurrence of this fauna or a fold that duplicates the strata. The very closely spaced jointing in the rocks so far up the creek suggests the latter







These dark fissile rocks are exposed above this *Pleurodictyum* bed clear up to 1900 paces, where *P. rana* was fairly abundant in the rocks just above stream-level. At 1900 paces a vertical cliff of 80 or 90' shows a long section of rock. At 1750 paces some of these quite <sup>dark</sup> shales were found weathered and here they are olive colored. I fully believe that a small fold has duplicated the *Pleurodictyum* bed.

At 2075 paces is the bottom of the falls. Here the hand level was used. Famine of the 1st 5' 5" of shale:- the bottom 2 1/2 - 3' had practically no fossils

<i>C. scitulus</i>	<i>P. rana</i>	at 5' 5" <i>P. stylopoda</i>
<i>L. laura</i>	<i>Orthoceras</i> sp.	<i>A. umbonata</i>
<i>P. fragilis</i>	<i>S. pennatus</i>	<i>P. constructa</i>
<i>S. fissurella</i>	<i>C. setigerus</i>	<i>B. leda</i>
<i>Buchiola</i>	<i>J. carinatus</i> (small)	

5' 5" - 10' 10" - *B. leda*, *S. truncata*, *M. pygmaea*, *A. umbonata*, *L. laura*, *N. triquetra*, *C. setigerus*  
*Lox. hamiltoniae* with shale concretions

10' 10" - 15' 15" *S. pennatus*, *C. congregata*, *Orthoceras* sp.  
 These shales have a faint grittiness to the touch and effervesce slightly. They are thus siltier here at 15' 15" and more calcareous than those below. Also, *N. lirata*, *Orthoceras* sp. and *Lox. hamiltoniae* with a concretion forming about it. These were common just below.

15' 15" - 20' 20" - *S. perplanus*,

20' 20" - 25' 25" *S. pennatus*. At 25' 25" a calcareous band yielded:-

<i>P. rana</i>	<i>S. andacrus</i>
<i>Lox. hamiltoniae</i>	<i>Cryptonella</i>
<i>J. carinatus</i> (transverse)	<i>A. boydi</i>
<i>J. gibbosa</i>	<i>M. harknessi</i>
<i>S. pennatus</i>	<i>M. concentrica</i>
<i>S. arctostriatus</i>	<i>M. oviformis</i>



✓ *E. lincklaeni*  
 ✓ *R. fimbriata*  
 ✓ *S. perplana*  
*S. munitum*  
*Platyceras* sp.

*J. limbata*  
 ✓ *L. densa*  
*C. vicinus*  
*S. inaequistriata*  
 ✓ *C. coronatus*  
*D. lineatum*

25' 25" - 30' 30" The rock in this interval is specially characterized by *C. vicinus* and *J. carinatus*. Other fossils are

*Grammysia* sp.  
 ✓ *J. lepidus*  
*P. potulus*

✓ *S. pennatus*  
*C. coronatus*  
*Byozoa*.

30' 30" - 35' 35"

✓ *S. pennatus*  
 ✓ *S. inaequistriata*  
 ✓ *J. carinatus*  
 ✓ *R. vanuxemi*  
 ✓ *M. oviformis*  
*Platyceras* 2 sp.  
*Aviculopecten* sp.  
*S. junia*  
*Cystodictya* sp.  
 ✓ *Pal. concentrica*

✓ *R. fimbriata* *S. munitum*  
 ✓ *A. spiriferoides*  
 ✓ *S. perplana*  
 ✓ *M. haskinsi*  
*P. rana*  
*S. munitum*  
*Lichenaria* sp.  
 ✓ *A. decussata*  
 ✓ *Pal - emarginata*  
 ✓ *C. vicinus*

These shales weather to a blue grey and are distinctly lighter than those at the bottom of the falls.

35' 35" - 40' 40" -

✓ *S. pennatus*  
 ✓ *Cystodictya*  
 ✓ *S. perplana*  
 ✓ *J. limbata*

*Platyceras*  
 ✓ *J. carinatus*  
*Fenestellidae*  
*Lichenaria* sp.

✓ *S. inaequistriata*  
 ✓ *R. vanuxemi* c  
 ✓ *D. lineatum* c  
*P. macrocephalus*

40' 40" - 45' 45" -

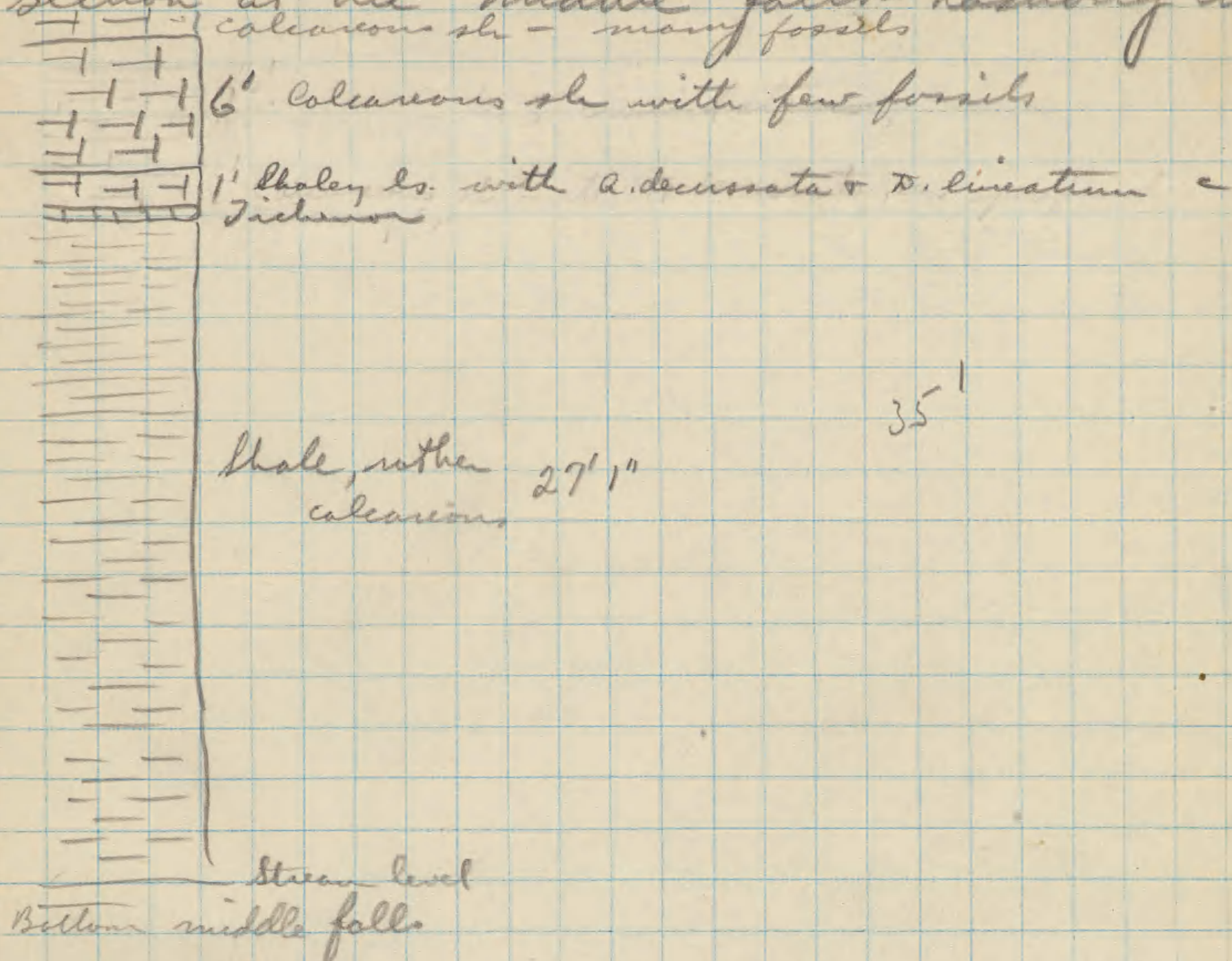
*S. pennatus*  
 ✓ *P. stylospora*  
*Byozoa* ccc  
 ✓ *Chaetetes*  
 ✓ *S. inaequistriata*  
 ✓ *S. perplana*  
*P. rana*

✓ *R. vanuxemi*  
 ✓ *S. rectum*

45' 45" - 70' 70" is 1 1/2' above the Lichenon



Section at the Middle falls - Kashong Ark.



From the bottom of the lower falls to the top of the Tichenor is 74' 4"

Assign the bed containing crinoid stems and very hard under the hammer to the Tichenor. This is at ~~slightly from~~ the crest of the falls, but there are also a few remnants of the bed just above the crest. This bed here has some shale in it, but is mostly a hard grey ls. It has:-

*S. macronotus?*

*Bygonia*

*S. pennatus*

*A. decussata*

*A. spiriferoides*

The bed just on the Tichenor and 1' thick has

*D. lineatum* c c

*Amulopecten* sp.

*A. decussata* c

*S. angustus*

*P. rowi.*



On the calcareous shale 6' thick I noticed no fossils but crinoid stems but on this layer there is another charged with fossils: -

This has: -

✓ *S. inaequistrate*  
✓ *S. macronotus*  
*D. lineatum* c  
*Platyrus*  
*A. princeps*

✓ *M. concentrica*  
*P. rowi*  
*I. exigua*  
*Comartoechia* 2 sp.  
*S. tellus* ? (Plate)  
*Gennaeocrinus* sp.

This bed is a hard shaley ls. grey in color and weathering to a light grey. Bryozoa are the predominating form. The bed forms a bench along the creek floor for

*H. halli*  
*Favosites*  
*Lichenalia* cc  
✓ *S. andaculus*

✓ *Rufimbrata*  
*S. mentium*  
✓ *P. pavilionensis*  
✓ *S. macronotus*

About 350 paces upstream the hard calcareous rocks have passed under the stream. Of these above the Tichenor there must have been about 15'. The beds that disappeared at about 350 paces were very fossiliferous but the fossils were difficult to procure. From this elevation on shale rocks prevail. These are dark blue-grey like the Earlville rocks and give a vigorous effervescence with acid. They offer a faint guttiness to the teeth.

At 397 paces, 5' above stream level were found *C. brothe*, + *Orthoceras* with *R. stolbnifera*. *Taomurus*

At 470 paces *P. tenuis*, 496 in debris, *Platthoria cylindrica*

At 583 paces a falls occurs over these blocky wane shales. Fossils are very few here. Only a



*Pterinopecten* was found, but a <sup>389</sup>  
*J. carinatus* was noted in the debris.  
 A large *Grimmysia*

At the top of the 3rd falls is hard  
 ls. band a little more than a foot  
 thick and contains *S. pennatus* and  
*C. scitulus*. The falls is 27' high + 3'  
 to the top of the ls. 57 paces above the  
 falls or 640 paces from top of Fichon  
 the shales are soft and blue grey,  
 breaking into small flakes. The rock  
 contains *J. carinatus* and small  
 concretions containing also *J. carinatus*  
 not unlike those seen above the  
 Menteth ls.

Here are

*S. granuloseus*  
*J. carinatus* cc.

*C. coronatus*

At 648 paces in the stream bed there  
 is a band of ls. containing the following  
 species:-

*S. granuloseus* cc

*S. inaequistriata*

*P. rana*

*A. spiniferoides*

*R. vanuxemi* c

*E. lincklaeni*

*Camarotoecchia* sp.

*Cent. impressa*

*C. bellistriata*

It is a hard shaley ls. and is about  
 3' above the hard ls. at the top of the <sup>Menteth</sup>  
 falls. On this are about 10' of shale  
 and then there is another hard  
 band of ls. In the intervening rocks  
 between these 2 ls. are found

*J. carinatus* cc

*Cystodictya* sp

*S. pennatus*

*C. coronatus*

*S. perplana*

*J. bellulus*

*C. boothi* var *callitides*

*C. bellistriata*

*Palaeoneilo* sp.

*C. scitulus*

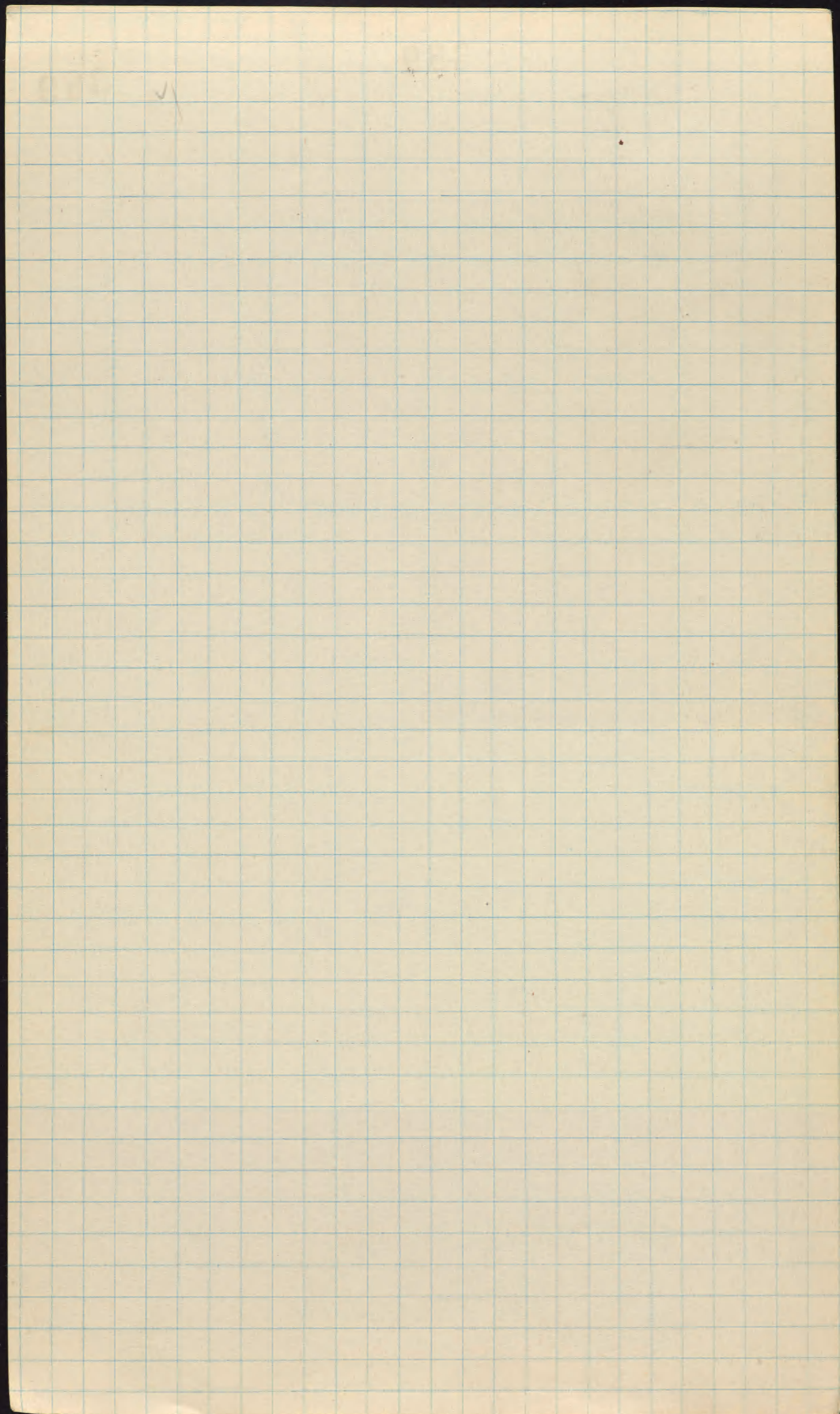
*O. undulata*

*Grimmysia* sp.

*G. bisulcata*

*C. tenuistriata*







Pal. concentrica 390  
P. nodocostata

S. marcyi

390

At 731 paces there is a cascade in the stream about 5' high. Thus in 83 paces the stone has dropped about 5' but it rises again, being about 3' above stream level at 814 paces above the Tichenor.

Just below the calcareous band causing the cascade fossils are numerous and here were found

S. perplana  
Modiomorpha sp.  
Cyrtodictya sp.  
H. carinatus  
C. coronatus  
H. dekaiei

A. spiriferoides  
S. pennatus  
S. concava  
C. vicinus  
R. vanuxemi

This 10' of shale contains also many concretions.

Bridge is at 814 paces upstream from Tichenor



August 8.

Bellona

Rain all morning; took trip into Penn  
Yam to ship package and notes. In  
afternoon worked under dam. Here  
about 15' of rocks are displayed below  
the Tully ls. which is well exhibited.

In the floor of the stream are  
slightly calcareous shales which  
erumbe easily. There are local lime  
concentrations in the form of concretions  
and local layers of fossils. *A. reticularis*  
is specially abundant here, along with  
*S. rectum*. Fauna in <sup>183'</sup> 13' feet below Tully.

<i>A. reticularis</i> cc.	<i>Gemmaecrinurus</i>
<i>Chonetes</i>	<i>P. rana</i>
<i>S. perplana</i>	<i>C. indenta</i>
<i>P. emarginata</i>	<i>S. inaequistriata</i>
<i>C. boothi</i>	<i>Lox. hamiltoniae</i>
<i>R. vanuxemi</i>	<i>C. spiriferoides</i> r.
Blastoid ( <i>Nucleocrinus</i> )	<i>I. corinatus</i>
<i>R. fimbriata</i>	<i>C. bellistriata</i>
<i>C. soppis</i> ?	<i>Pal. concentrica</i>
<i>C. setigerus</i>	<i>Pal. plana</i>
<i>C. scitulus</i>	<i>Aviculopecten</i> sp.
<i>M. concentrica</i>	<i>Lox. delphicola</i>
<i>D. lineatum</i>	<i>Platyceras</i> sp.
<i>A. princeps</i>	



Fauna in first 6' below Tully.

*M. pygmaea*  
*J. submarginata*  
*Ceratopora*  
*S. tullius*  
*N. corbuliformis*

*C. boothi*  
*S. munitum*

The shales here are dark, fissile and not unlike the Genesee. They break into small chips. The fossils below the Tully are all small (dwarfed) and many are pitted. Pyrite is also very common in concretions.

From 6' - 6 1/2' below the Tully this half foot is crowded with fossils: -

*L. laura* c  
*M. subalata* c  
*S. tullius* c  
*Lingula* sp c  
*C. boothi*  
*D. capillaria*  
*N. oblongatus*

*N. corbuliformis*  
*S. munitum*  
*J. submarginata* c  
*Orthoceras* sp.  
*S. andaculus*  
*P. emarginata*  
*B. leda*

6 1/2' - 11' 5" below -

*S. andaculus*  
*C. bellistriatus*  
*S. tullius*  
*Lingula*  
*N. laticosta*  
*C. scitulus*  
*V. pustulosa?*  
*N. oblongatus*

c *J. cingatus* small 7' below  
*Cran. hamiltoniae*  
*M. subumbona* re  
*J. cingatus*



$$\begin{array}{r}
 2 \quad 2 \\
 2 \quad 6 \\
 \quad 5 \\
 1 \quad 9 \\
 \quad 4 \\
 \hline
 5 \quad 26 \\
 7 \quad 24
 \end{array}$$



11'5" - 13'5" -

*C. scitulus* C  
*I. carinatus*  
*I. subemarginata*  
*C. setigerus* V  
*Cron. hamiltoniae*  
*Pholidops ham.*

*Leiopteria* sp.  
*Pal. emarginata*  
*R. var. semi*  
*C. bellistrata*  
*H. bellistrata*

Between 13' + 15' below the Gully  
*A. reticularis*, the corals and bryozoa  
 come in. Also in this interval the  
 shales become less fissile. It may  
 however be because they are nearer  
 the stream & less subjected to the sun.  
 There are here 18'3" of shale exposed  
 below the Gully.

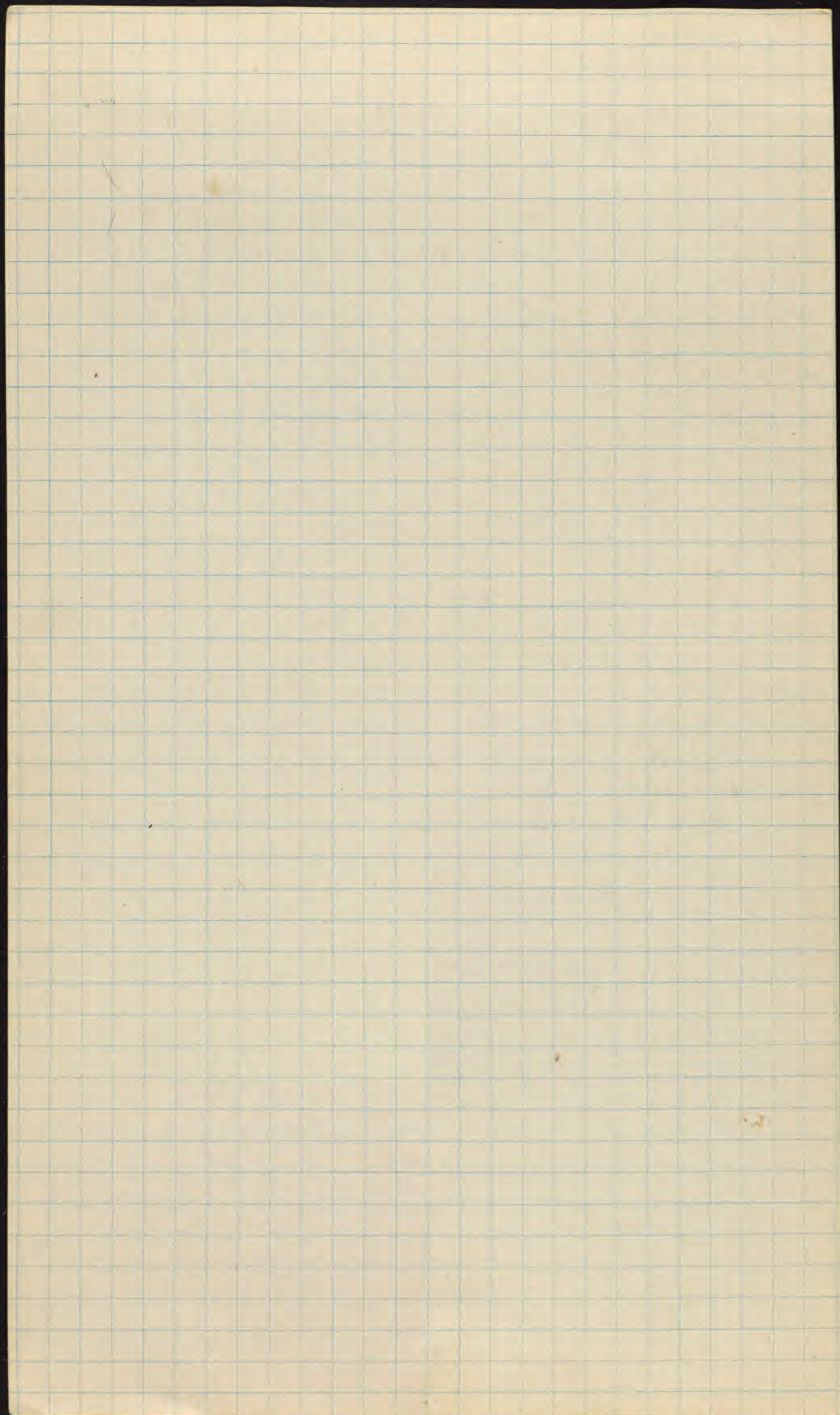
### Gully

Mounds to Moscow. Under dam  
 appears to dip to south but probably  
 reverses its dip and appears upstream  
 again dipping north thus making  
 here a shallow trough. It consists  
 of 5 layers, the lower one is 2'2" thick.  
 The next is 5" thick, the next is 2 1/2'  
 the next 1'9", and the last which is  
 shaly & bears corals is 3-4". This  
 makes the total thickness 7'2". By  
 hand level I made it 7'10".

The lower layer has erinoid stems  
 in it. The upper 2 layers bear corals  
 and at the <sup>conjunction</sup> contact on the north  
 side of the dam these are very  
 abundant in a shaly ls.

The rock when weathered has a  
 tendency to split into large or small  
 angular, irregular, blocks & fragments  
 so that with a wind or blow







a large boulder can be shattered to bits.

A short distance south up the hill and then east along the first dirt (private) road to the top of the hill and  $\frac{3}{4}$  of a mile along it is a quarry in the gully. The stone is so fragmentary that the ordinary quarrying methods are not necessary and after blasting it can be shovelled up. (not actually seen in operation but judged from apparatus & condition of rock).

Aside from corals I saw few fossils in the Gully. *P. rana*.

A little east of the dam in the woods the Gully appears to have ~~only 5~~ layers. The lowest is 23" the next 5", the middle one is 31", the next 22", and the last 2" = 7' 1".

The Henessee on the Gully was not calcareous.

In places the surface is marked by furrows or matted masses of stem-like forms.

The stone is the usual blue grey on a fracture surface.



Aug 9.

Fauna of hard ls band: at 731  
paces above the Lichenor: -

*S. pennatus* cc *P. rana*

*C. mucronatus* c

Wood

*C. scitulus*

*C. coronatus*

This 4" of stone is very hard and is a  
grey ls. like that at the falls at 583  
paces

Below this band in the shales with  
*Gammysia*, etc were noted *S. pennatus*,  
*C. vicinus* and *C. incisurata*, *A. erectum*?

In the shaley ls. just below the harder  
4" layer are: -

✓ *S. concavo* c.

*S. rectum*

✓ *S. perplana* c

✓ *T. curvatus* c

✓ *C. coronatus* c

✓ *S. grandis* cc

Crinoida

*C. boothi*

Chaetetes

✓ *C. bellistriata*

*P. rana*

Bryozoa

✓ *A. spiriferoides*

*P. iowensis* (n).

*T. exigua*

✓ *A. princeps* ?

~~*Pal. constricta*~~

✓ *Pal. constricta*



This zone with *S. concava* is about 1 foot thick and overlies the concretionary bed of about 10' that carries *T. carinatus* and *Pleurodictyum*. This foot is divided into two parts, the lower & very fossiliferous part is a shaly ls., the upper is characterized by abundance of *S. pennatus* but few other forms and is only 4" thick. The upper 4" is the most resistant and well displays the gentle undulations of the rock.

Ls. at 583 paces restudied: -

Fauna: -

<i>C. coronatus</i>	} Found in the 1' below the ls.
<i>Taomurus c</i>	
<i>P. rana</i> (huge)	
<i>T. carinatus</i>	
<i>S. pennatus</i>	

This ls is one foot thick: and contains

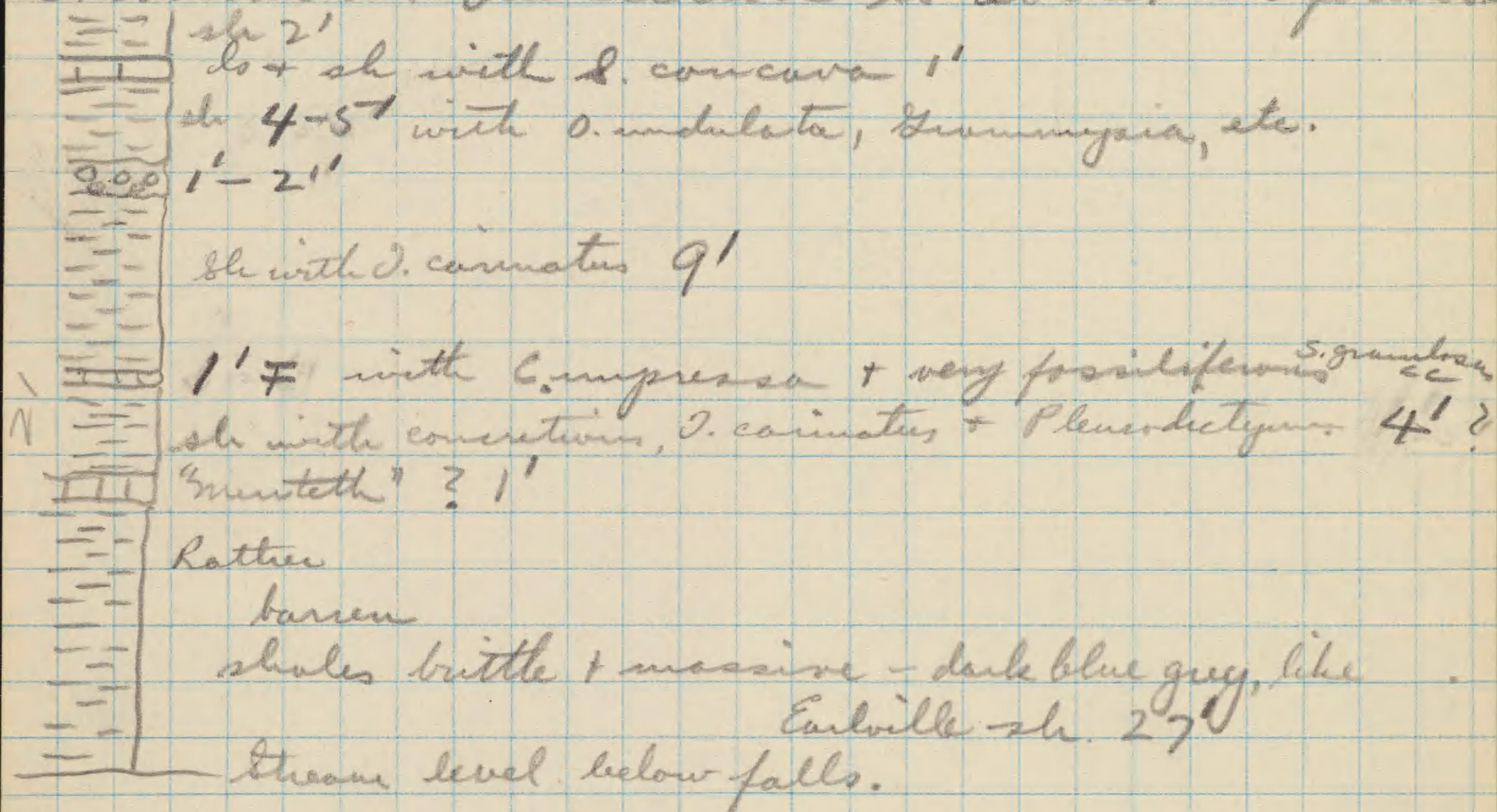
<i>S. pennatus</i>	<i>T. carinatus</i>
<i>P. rana</i> huge	<i>C. setigens</i>
<i>S. granulosa</i>	
<i>C. coronatus</i>	

It is a very hard even grey ls., 1' thick and may be the Menteth. It is overlain by 10' shales carrying *T. carinatus*, concretions and *Pleurodictyum*, as is the Menteth at Menteth ravine. The ls is nodular in local patches, contains some shale and also *Taomurus*. It dips rather strongly, I should judge about a degree or more into the stream and this is its only appearance. It is exposed from the edge of the falls to about 30 yds upstream. On a weathered face irregular (flint-like) masses stand out, also some of the fossils, and these two phenomena were noted in the



## Menteth.

50 paces upstream from Menteth? comes a calcareous band a few inches (5) thick contain *C. impressa* and 70 paces above this comes the band with *S. concava*. The section is about as follows:



The 2' of shale on the *S. concava* band carry:

<i>C. lucronatus</i> c	<i>C. boothi</i>
<i>A. reticularis</i> (first appearance) cc	<i>Pal. concentrica</i>
<i>S. mentium</i>	<i>S. perratus</i> c
<i>Orthoceras</i> sp.	<i>Loph. hamiltoniae</i>
<i>E. lucina</i>	<i>M. concentrica</i>
<i>P. rana</i> c	<i>M. mytiloides</i>
<i>Par. hamiltoniae</i>	<i>Ceratopora</i> (small reefs)
<i>C. incisurata</i>	<i>J. carinatus</i> cc
<i>A. spiriferoides</i> cc	<i>C. scitulus</i>
<i>N. lamellata</i>	<i>Pal. tenuistriata</i>

This shale is coarse and very gritty to the teeth. It contains a few concretions, one of which contained a great deal of sphaerulite.



At 731 paces the 4" ls on the S. concava band forms a cascade, at 583 paces it is about 21 or more feet above the "Menteth". At 814 paces the concretionary bed below it is at stream level & the ls is about 4' above stream. This is just under the bridge at 814 paces. At 844 paces it is 8' above the stream. At 948 paces it is still 8' up but beginning to drop. At 987 paces the concretionary layer is again in the stream. At 1046 paces the band is 1 1/2' above stream level. At 1130 it is 2' above stream level. At 1179 and for 47 paces the concretion band is exposed in the bed of the creek. At 1351 the concretionary band is 5' above stream.

The coarse shales here below the concretionary bed yielded:-

<i>G. arcuata</i>	<i>J. cuneatus</i> cc.
<i>Pal. concentrica</i>	<i>S. marci</i> ?
<i>J. submarginata</i>	<i>P. lanceolata</i>
<i>S. solenoides</i>	<i>Schizodus</i> sp.
<i>P. discoidium</i>	<i>N. oblongatus</i>
<i>C. coronatus</i>	<i>B. leda</i>
<i>Lingula</i> sp.	<i>Grammysia</i> sp.

At 1410 the S. concava band is 10' above stream level. 1570 paces it is 8' above stream. 1650 paces the concretionary band goes below stream level. 1603 paces the S. concava band is in the stream bed & forms a 2' cascade. At 1788 paces the 3' of sandy shales on the S. concava band forms a long flat in the stream bottom. The sandy shale is exposed for 4 1/2' above the S. concava band.



It has

<i>C. mucronatus</i> cc	<i>S. pennatus</i> c
<i>L. punctata</i>	<i>Productella</i> sp.
<i>A. reticularis</i> c	<i>P. rana</i>
<i>A. spiriferoides</i> cc	<i>Paw. hamiltoniae</i>
<i>Pal. concentrica</i> c	<i>M. concentrica</i>
<i>C. incrassata</i>	<i>Loy. hamiltoniae</i>
<i>Pholidops ham.</i> ?	<i>C. scitulus</i>
<i>C. coronatus</i>	

The lower 3' are hard, brittle & slightly calcareous; the next 1 1/2' appear to form a transition to the shales above which are softer, slightly calcareous and weather into small fragments and are much more fossiliferous in point of numbers of individuals. Thus this 1 1/2' is softer but still retains its grittiness.

The beds of shale above carry:-

<i>A. umbonata</i> ccc	<i>S. pennatus</i>
<i>P. rana</i> cc	<i>S. granulatus</i>
<i>Pal. fecunda</i>	<i>N. triquetra</i>
<i>C. mucronatus</i>	<i>C. bellistriata</i>
<i>C. boothi</i>	<i>D. consobrinus</i>
<i>M. pygmaea</i>	<i>M. concentrica</i>
<i>N. corbuliformis</i>	<i>Pholidops ham.</i>
<i>Orbiculoidea</i> sp.	<i>C. coronatus</i>
<i>C. indenta</i>	<i>A. spiriferoides</i>
<i>S. perplana</i>	

The *S. granulatus*, *A. spiriferoides* and *D. consobrinus* were found about 2' above the sandy band. The *Ambocoelia* become very abundant between 4-8' above the sandy band.

1831 in stream bed:-

<i>A. umbonata</i>	<i>S. pennatus</i>
<i>C. bellistriata</i>	<i>D. consobrinus</i>
<i>A. spiriferoides</i>	



1860-1919 - liatus. At 1919 paces the following were found.

*A. umbonata* c.c. *Phol. hamiltoniae*

*Pal. fecunda*

*C. bellistriata*

There are almost continuous exposures of this rock to 2185 paces.

At 2300 a long exposure in places very high begins. Here along the creek + 5' up the following are found:-

*M. pygmaea*

*C. scutulus*

*Pholidops hum.*

*P. rana* c.c.

*C. boothi*

*N. liata*

*A. praecumbona?*

*C. setigenus*

*Pal. constructa*

*A. umbonata* c.c.

*C. bellistriata*

*Circulosecten* sp.

*S. pennatus*

*M. pygmaea*

*N. corbuliformis*

The shales here are very dark grey. This rock is exposed for 150 paces.

Except for a small exposure in the stream no rock is exposed from 2450 paces to 2560 paces. Here at 2560 *A. umbonata* is still common. This exposure is only 12 paces long but is 20' vertical.

2272-3050 liatus. At 3091 paces the following species were seen:-

*A. umbonata*

*I. carinatus* (small)

*P. rana*

*Pholidops hamiltoniae*

*C. mucronatus*

*A. praecumbona?*

*N. corbuliformis*

*C. bellistriata*

*S. andalus*

*N. oblongatus*

*A. spiniferoides*

*S. mentum*

*S. granulatus*

Partly  
25-72



At stream level the shale is hard and in places is a ls. containing *S. rectum*. Above the stream the rock is soft + dark.

In the ls. (thin band at stream level)

<i>A. reticularis</i>	<i>S. rectum</i>
<i>R. vanuxemi</i>	<i>C. mucronatus</i>
<i>S. granuloseus</i>	

This *Atrypa* fauna extends for about 3' above stream level, then comes the Ambocoelia fauna with

<i>C. mucronatus</i>	<i>A. praecumbona</i>
<i>M. subalata</i>	<i>A. umbonata</i>
<i>I. carinatus</i>	<i>Orbiculoidea</i> sp.
<i>C. bellistriata</i>	<i>C. scitulus</i>
<i>P. rana</i> c	<i>Pholidops</i> leam.
<i>N. lirata</i>	<i>N. corbuliformis</i>
<i>N. concinna</i>	<i>L. laura</i>
	<i>M. subumbona</i> ?

Shales at 33.25 - 34.48

*P. hermes*.  
*S. andaculus* c  
*A. spiriferoides*  
*S. inaequistriata*  
*S. granuloseus*  
*I. subemarginata*

*Eidophylloids*  
*C. bellistriata*  
*P. rana*.  
*S. junia*  
*A. princeps*

34.48 - 35.31 liatun

35.31 - 37.30'

*A. reticularis*  
 Bryozoa  
*C. mucronatus*  
*S. inaequistriata*  
*A. spiriferoides*  
*S. andaculus*  
*Camarotoechia* sp.

*P. rana*  
*S. junia*?  
*S. granuloseus*  
*C. incessans*  
*O. parvula*  
*C. boothii*  
*S. pennatus*



at 3650 paces about 30-35' of Moscow are displayed under the Tully. It is a light grey rock containing many concretions and lenses of ls. which contain the fossils. From here to about 12' below the Tully *A. reticularis* & *Spinifers* with *S. rectum* & *Endoplyllum* prevail.

at 3735 paces - *S. concava*, & *T. limbata* can be added to the list of species.  
*T. carinatus*, *R. vanuxemi*, *M. concentrica*  
 3860 paces to bottom of dam.

Tully makes another falls beyond and behind the village



August 9.

Just outside of Geneva along the lake Road on the east side of the lake and under the Lehigh Valley bridge is an exposure of Cardiff shales which in the lower 3' are blue black in color on the surface when fresh but on a fracture section are a very dark grey. The shales give a grey streak. Fossils are rare but *C. setigerus*, *B. leda*, *Leiorhynchus* sp., *P. fragilis* were noted in the first 5'. *Orthoceras* sp. There are a little more than 20' of shale exhibited. On the surface it weathers to a very light grey and where leached an olive color, even in section.

Retrospect on Kashong Creek, Moscow

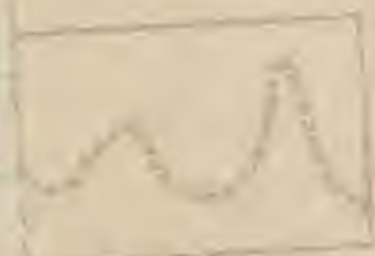
Above the Tithonium comes a very fossiliferous band for about a foot then several feet of hard, sandy(?) calcareous shales followed by calcareous and very fossiliferous rock which is succeeded for a long interval by rather unfossiliferous shales. Prolonged collecting however would probably bring to light from these a good Peltopod fauna. On these shales at the 3rd falls is a ls like the Menteth + on this shales with *J. corinatus*, capped by a band of calcareous stone bearing *S. concava*. Upon this is a long series of shales containing a fauna characterized by *Atrypa reticularis* + *Streptelasma*. This is interrupted about 40' (?) from the top by a zone with *L. laura* and *A. praeambona*. Below the *Atrypa* zone is a long Ambocoelia zone. Just under the Tully were about 12' shale with *L. laura* + *S. tellus*.



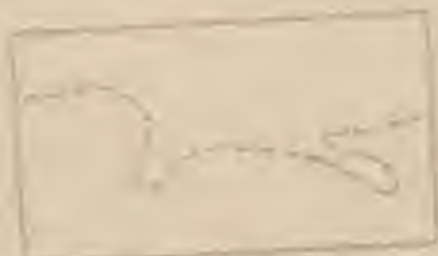
4036

# CONVENTIONAL SIGNS

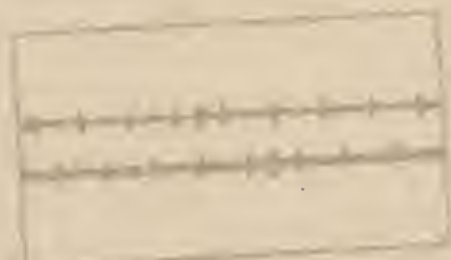
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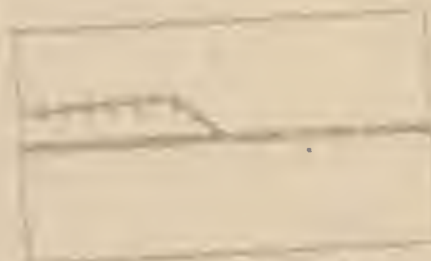
Private or poor road



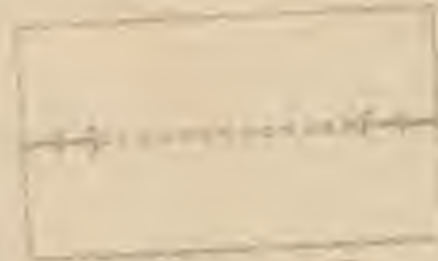
Trail or path



Railroads and stations



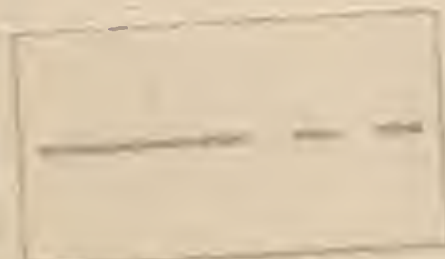
Electric railroad



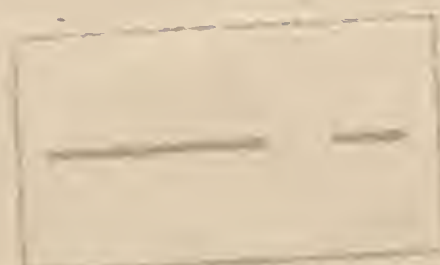
Tunnel



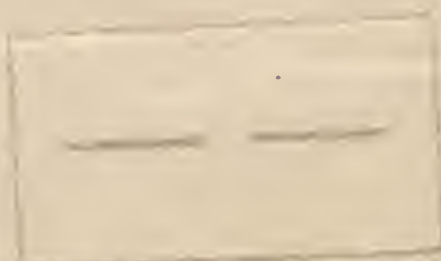
Wharf



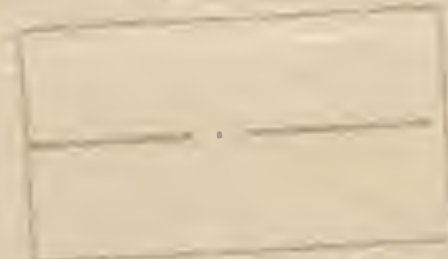
State line



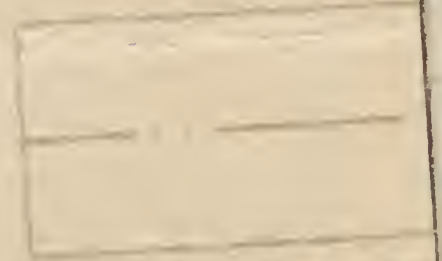
County line



Civil township or district line



Reservation line



Land grant line



Tanks and oil reservoirs



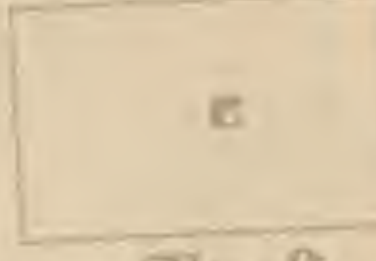
Oil wells



Mine or quarry



Prospect



Shaft



Levee



Streams



Falls and rapids



Intermittent streams and ditches



Sand and sand dunes



Sand and sand dunes



Intermittent lake



Glacier



Spring

(or shown by contour)



R  
I  
E





403a

culture  
ds, and

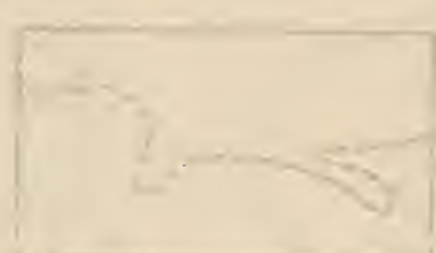
The hill on the right has a rounded summit  
ing spurs separated by ravines. The spur

## CONVENTIONAL SIGNS

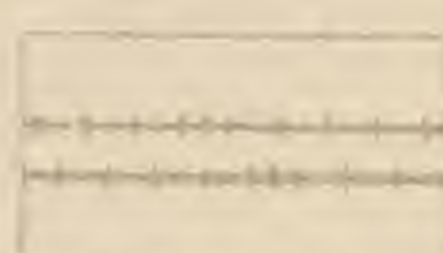
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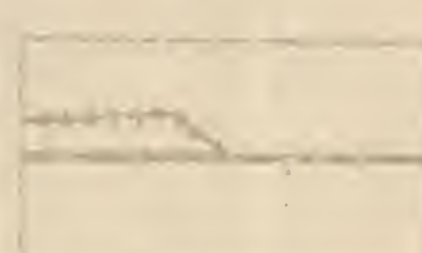
Private or  
poor road



Trail or  
path



Railroads  
and stations



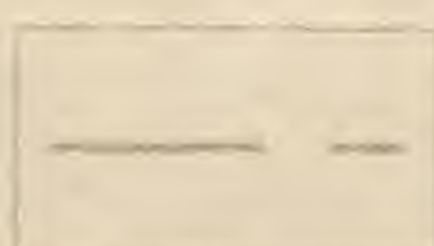
Electric  
railroad



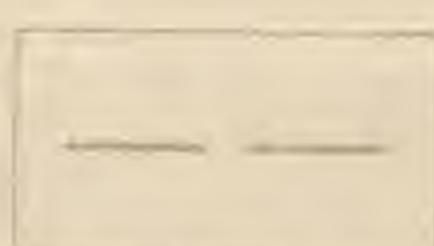
Tunnel



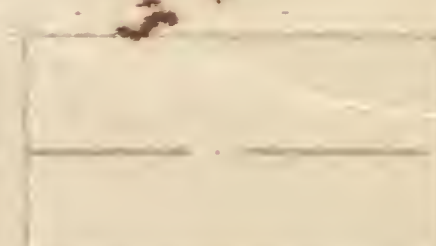
and  
es  
orders  
State line



County line



Civil township  
or district line



Reservation  
line



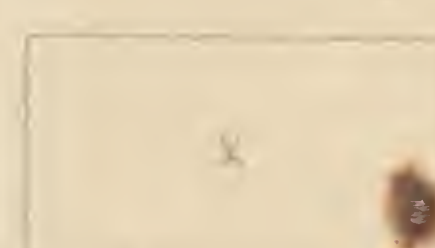
Tanks and  
oil reservoirs



Oil wells



Mine or  
quarry



Prospect



Levee



Streams



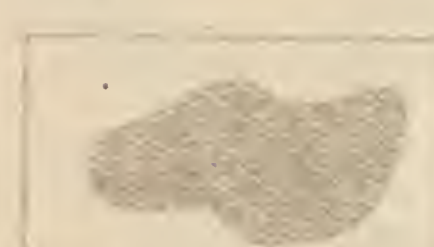
Falls and  
rapids



Mounds or  
debris



Sand and  
sand dunes



Intermittent  
lake



Glacier  
(Or shown by





I  
E

Stony Point

Woodlawn  
Beach

Abbot Springs

Bay View

Steelton

ELECTRIC

R. R.

H  
A  
M  
B  
U  
R  
G

Blasdel

Mulberry Road

Roland

PITTSBURGH

West Seneca

Creek  
S  
E  
N  
E  
C  
A

Windom

BUFFALO

Albany Road

E  
A  
S  
T  
H  
A  
M  
B  
U  
R  
G

East Hamburg

Orchard Park

Reserve

Seneca Spenezer

403a

50'

78



404c

## ED STATES

gradually away and forms an inclined table-land that is  
versed by a few shallow gullies. On the map each of  
features is represented, directly beneath its position in  
sketch, by contour lines.

The contour interval, or the vertical distance in feet between  
one contour and the next, is stated at the bottom of each  
This interval differs according to the topography of the  
mapped; in a flat country it may be as small as 1 foot; in  
mountainous region it may be as great as 250 feet. On  
contour lines, every fourth or fifth one, are made heavier  
than the others and are accompanied by figures showing altitudes.  
The heights of many points—such as road corners, summits  
~~surfaces of lakes~~ and bench marks—are also given on the



# LAKE ERIE



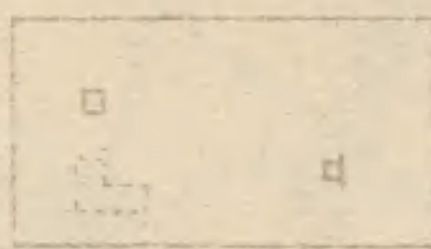




City or village



Roads and buildings

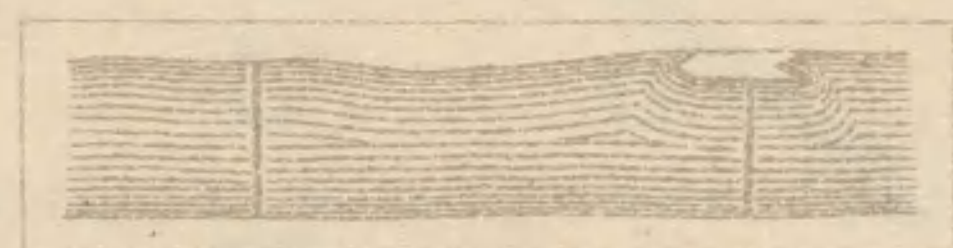


Ruins

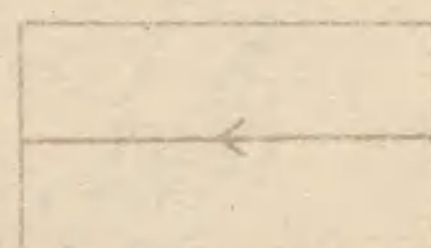
Cliff dwelling

Metaled road  
(distinguished on recent maps only)

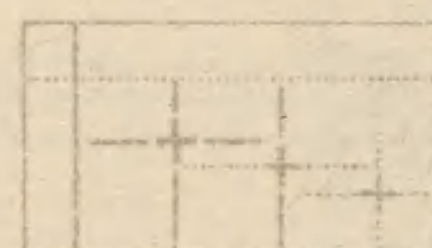
Private property



Dam



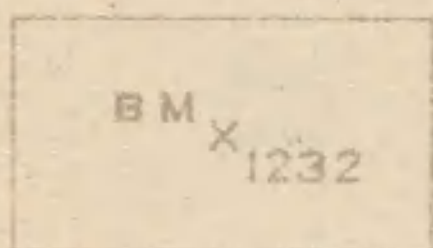
Dam with lock

Canal lock  
(point upstream.)

U.S. township and section lines and located corners



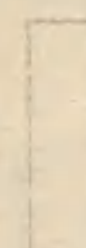
State boundary

Bench mark  
(Temporary bench mark shown by brown cross and black figures without lettering)

Cemeteries

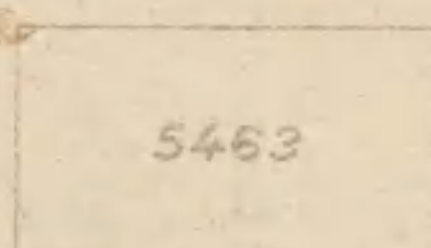
Church, School  
(distinguished on recent maps)

Coke ovens



Tallow

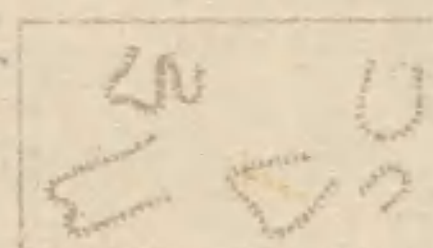
### RELIEF (printed in brown)

Figures  
(showing height above mean sea level instrumentally determined)Contours  
(Contours showing depth of water printed in blue)

Depression contours



Wash

Cliffs  
(or shown by contours)

Mine dumps



Tailings or mining debris

gradually away and forms an inclined table-land that



July 13.

15-mile Creek - short collecting and reconnaissance revealed in stream bed and for about 20'-25'-30' <sup>near bridge</sup> gray calcareous shales, weathering to small fragments or falling to a clay. Crushed between the teeth there is no trace of grit. In the stream-bed and throughout the section are courses of calcareous and pyrite concretions, or a combination of both. These are small or larger and often grotesque in shape, and always irregular. They often contain well preserved fossils, sometimes pyritized fossils.

In the stream-bed and for about five feet above the following fossils were common:

*A. spiriferoides*

*S. pinnatus*

*S. lanna*

Other fossils are *Pholidops*, *Phacops* and *C. boothi*, *Platyceras*.

In the uppermost 2 or 3' of this shale *A. spiriferoides*, *S. pinnatus*, *Spirifer* (large, undepressed?) and a coral? are common. *S. delissus* was also noted.

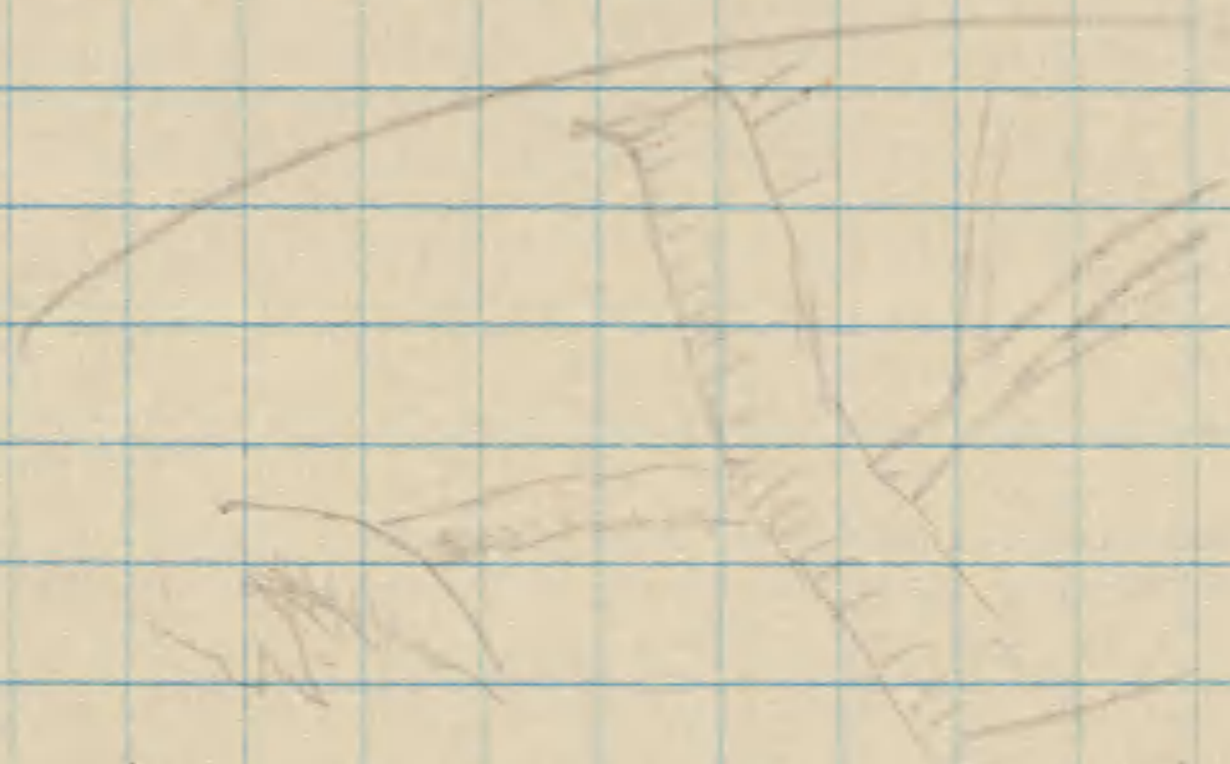
The Tichenor? grit, or stone gray shales and is a hard brownish-gray ls., granular with many ovoid fragments and abundant fossils. The rock abounds in pyrite in long cylindrical nodules or disseminated in the ls. The rock stains orange red from the pyrite & breaks into granules. Fossils noted -

*Eumphalus* sp.

*Favosites* - disseminated throughout, abundant in spherical clumps.

*Strophomena* & *fenestella*





Shape of pyrite  
in Lichen on  
weathered surface



*Spirifer*  
*Cryptonella*  
*P. flabellum*  
*A. decussata*  
*A. princeps* ?  
 Corals  
*Leiopteria* sp.

*D. lineatum*  
*Platyceras* sp.  
 Rimmed plate in ~~E.~~ observed  
 in Tichenor is probably  
*Gemmaeocrinus myra*  
*D. sculptilis*

Above the Tichenor are grey shales,  
 breaking & weathering into larger fragments.  
 Near their base are many corals, but  
 at the base *A. embovata* is very  
 abundant.

Note: There are masses of <sup>ls.</sup> ~~ls.~~ on some  
 of the Tichenor blocks that appear shaly  
 and like some of the calcareous concretions  
 rocks below, in texture. These pockets or  
 patches are very fossiliferous at times.



July 14.

Cardiff Shale — Exposed in the low cliffs along the shore directly behind "Bob" Smith's Bay View Hotel. Directly behind the hotel the shales are about 18' vertical and are ~~dark~~ grey on the dry weathered surface. In cross-section they are dark grey with a brownish cast (olive). A cursory examination showed only *Styliolina* but in great abundance in the layers about 3' above lowest rock exposed (which is about 2-3' above H. O. level). The streak of the shale is brownish grey. In the lower layers when they were fractured they had a distinct bituminous odor, much like oil shale.

A loose calcareous slab here had many *Styliola* and also a *Spirifer* perforated in it.

140 paces south of hotel section is 13' 10" thick. Lower and upper layers have *Styliola* in abundance. It seems to range through the shales exposed here. From 10' - 13' 10" other fossils were noted but none are abundant.

*H. trigona* ✓

✓ *Orthis*? sp.

*H. oblongata* ✓

✓ *Smil* (*Bumopsis* beds?)

*C. setigera* ✓

Some of the layers

are quite calcareous notable in the bottom along the H. O. level, forming a bench along the beach. This is not however a significant layer. It smells bituminous in part. The shale at 13' has a brownish cross-section somewhat like that on Annapolis.



$$\begin{array}{r}
 37'5'' \\
 \underline{2''} \\
 750 \\
 \underline{793} \\
 845 \quad (281) \\
 3 \overline{) 845} \\
 \underline{6} \phantom{0} \\
 24
 \end{array}$$

$$\begin{array}{l}
 \frac{10''}{10} = 200' \\
 \frac{5''}{10} = 2600' \\
 \frac{1''}{10} = 260'
 \end{array}$$

$$3\frac{1}{2}$$

$$\begin{array}{r}
 3' \quad 6'' \\
 \phantom{3'} \quad 8'' \\
 \hline
 10' \quad 10'' \\
 \underline{13} \quad 24''
 \end{array}$$

$$\begin{array}{r}
 37'5'' \\
 \underline{2''} \\
 750 \\
 \underline{794} \\
 844
 \end{array}$$



Much of this Cardiff has the same concretionary structure as seen in the Onondaga Earth & Shale. shales at Hamilton. It is possible that alptoria form by cementation in the curved fractures of this shale. Breaking into curved plates

Picture 3 roll 2 Cardiff 140 paces S. hotel

290 paces south of hotel - section excellent about 14' thick and in the upper layers contains fossils. These upper shales are calcareous as a test with acid shows. They do however break about like those below. They weather <sup>to light</sup> grey when exposed to the sun. Fossils observed here are

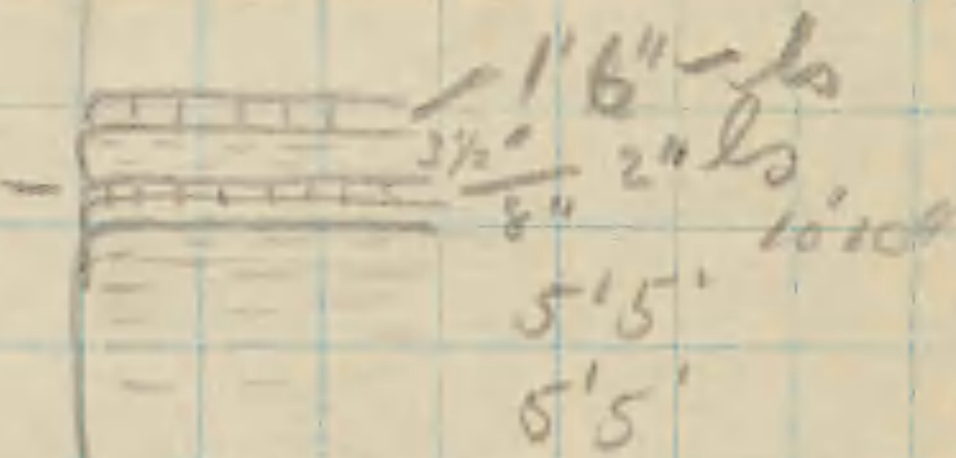
P. rana	r✓	✓ Leiorhynchus sp (limitae?)
S. pennatus	r✓	✓ Bucanopsis leda r
A. umbonata	c✓	✓ Styliolina c
Chonetes mucronatus	r	Orthoceras sp r
C. boothi	✓	

Picture 4, roll 2 Cardiff 340 paces

375 paces south of hotel. on beach.

about 11 1/2' above lowest exposed rock (one foot above water level, total 12 1/2') ~~is~~ is a band 2" thick of very calcareous shale with fossils. Then 3 1/2' shale the upper part weathering to brown stone in cross.

section. On this is a 1 1/2' band of ls. with Leiorhynchus and M. triquetra. Between the 2 ls layers Styliola is very abundant.



400 paces below hotel ls 1 1/2' band forms top layer under the soil. & has C. setigera



$$\begin{array}{r}
 2140 \\
 \underline{2140} \\
 4280 \\
 \underline{1070} \\
 53
 \end{array}$$

2

$$\begin{array}{r}
 8 \cdot 5 \\
 \underline{4 \cdot 4} \\
 13
 \end{array}$$

$$\begin{array}{r}
 2140 \\
 \underline{2} \\
 4280 \\
 \underline{535} \\
 280 \overline{) 4815} \quad (1 \frac{1}{10} \quad 280! = \frac{1}{10}
 \end{array}$$

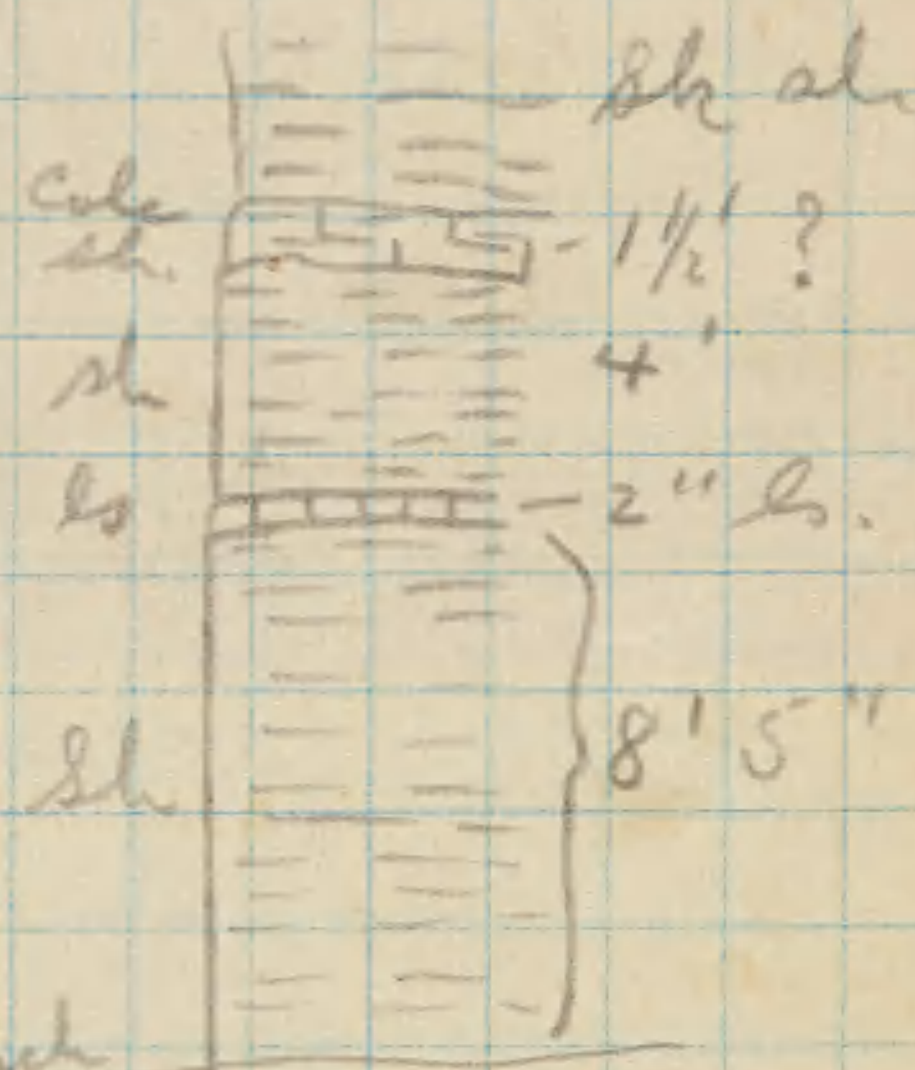
$$\begin{array}{r}
 280 \\
 \underline{8} \\
 1080
 \end{array}$$

$$\begin{array}{r}
 5 \quad 5 \\
 \underline{4 \quad 1} \\
 9 \cdot 8
 \end{array}$$

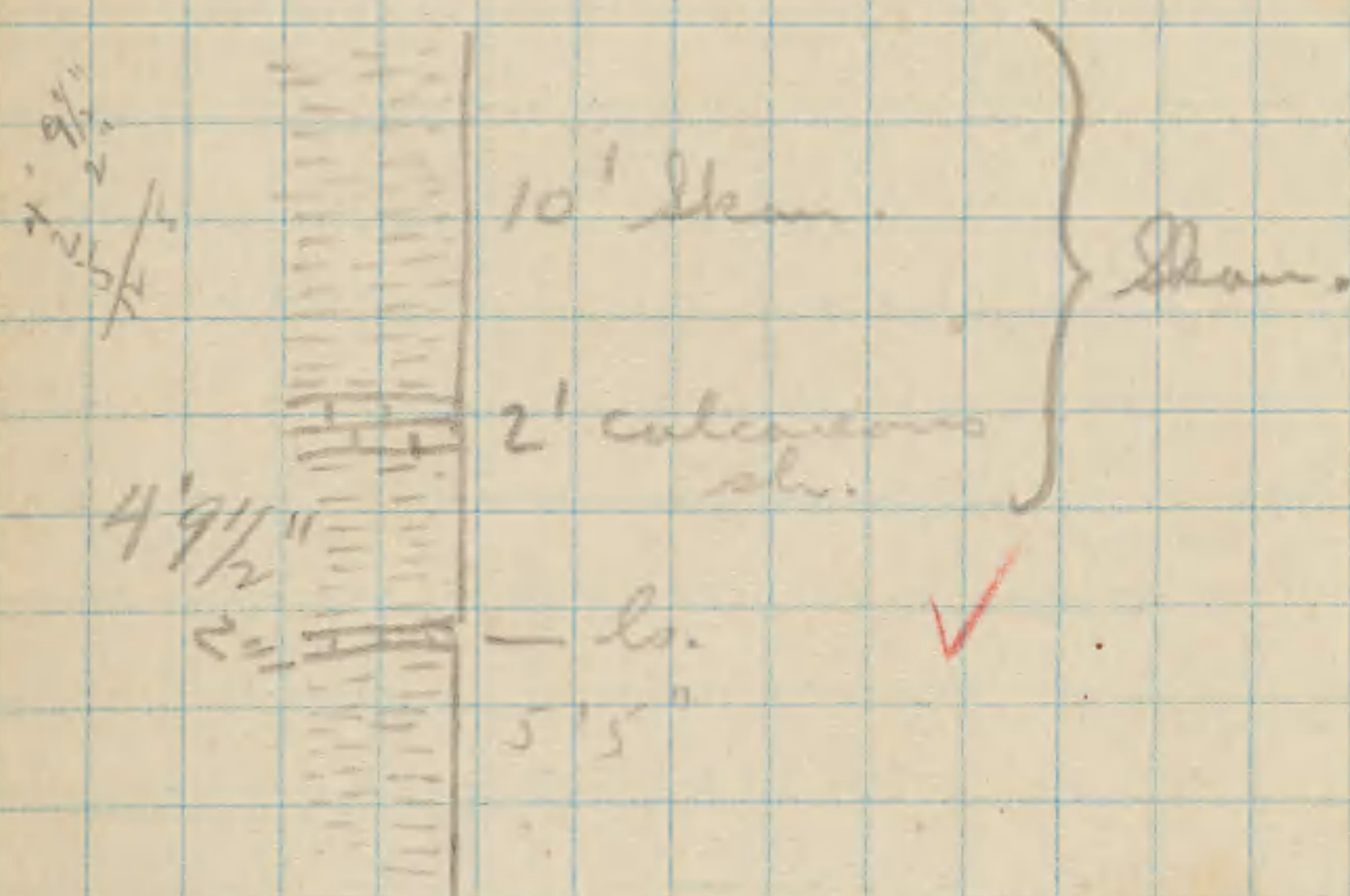


2140 paces south of Smith's (Bay View Hotel) exposures of shale rock are again met with and are about  $17\frac{1}{2}'$  vertically. These are exposed behind Louis' Lake Shore Restaurant. The lower 9' are shale giving a bituminous odor when fractured and bruised.

Section at Athol Springs about 100 yds s of Louis' Restaurant. The Cardiff below this — 5' 5" shaley ls. is somewhat calcareous.



Section a short distance south — between Athol Spr. & Hamburg Park



The 2' calcareous band is succeeded by 10' (here) of very soft shale that crumbles to fragments even smaller than the Cardiff below. This shale, like that below, effervesces with acid.

This 2' calcareous sh bed at base of sh. descends  $11\frac{1}{2}'$  in 1375' which amounts to about 44' per mile as one component of the dip



## Just north of Hamburg Park

Sh. sh. -

On top of the 2' shaly ls., which is hard and forms a rising bench all along the shore are soft grey shales that can be crumpled readily to a clay. These fall naturally into thin flakes. The formation as exposed here is not very fossiliferous. In the 2' ls. sh. were noted *C. retigera* and *L. laura*. In the soft shales *P. fragilis*. These shales are in strong contrast to the Ludlowville shales above, with their numerous fossils and many courses of concretions. Concretions in this bed at Bethel Springs are confined to about 15' above the 2' band of calcareous sh. They are calcareous and spherical.

A number of concretions were opened but none contained fossils. Some beautiful specimens of *S. pennatus* were found in the tubs along the cliffs. They were not rounded by waves and their freshness strongly suggested their origin from the sh. above. These shales are calcareous, effereasing on a fresh fracture with acid.

~~*S. imperfecta* c  
*B. lida* c  
*S. (H. lida)* c  
*B. subulatum* c  
*N. oblongatus* u  
*S. pennatus* u  
*N. triquetra*  
*P. laura*~~



July 14.

Section about 50 yds. S. of Hamburg Park  
Hamburg Park is 80 paces north of Avery's

13' 8" ls. with *Leptodonta*, *Leptodonta* etc.  
ls. 27' 1' }  
14' }  
ls. 27' 1' }  
14' }  
ls. 27' 1' }  
14' }  
ls. 27' 1' }  
14' }

A band of ls. is prominent in the sh. probably terminating it here. A calcareous band about 14' above beach *S. pennatus* occurs. In the soft sh. *P. rana* was found.

Section on Avery's Creek.

Roll 2 Shearwater

27' }  
3" *Strophomena* bed  
4" ls. with *S. pennatus* (concretionary)  
sh - some concretions  
- *Leptodonta* in lowest layers

Avery's Creek.

The *Strophomena* bed is about 8" thick here and forms a cascade in Avery's Gulch. It is a dark grey ls. with a blocky or concretionary structure thus weathering into individual blocks or slabs. The fauna is rich and is as follows. - see next page

In the shale (2') underlying the *Strophomena* bed there are fossils like those in the ls. snails being abundant. Especially abundant however is *P. rana*. Other fossils are -  
*C. boottii* var. *callitides* *C. lida*  
*I. caninatus* *Platyceras* sp.  
*S. pennatus*  
*L. boottii*



411

411

*Strophalosia* bed fauna

<i>S. truncata</i>	cc ✓	<i>N. oblongatus</i>	✓
<i>B. leda</i>	c ✓	<i>N. triquetra</i>	✓
<i>S. subulatum</i>	c ✓		
<i>Prana</i>	re ✓		
<i>C. boothi</i>	✓ ✓		
Snails ( <i>Gyromia</i> , etc.)	✓		
<i>Lop. hamiltoniana</i>	re ✓		

On the few inches of shale on the *Strophalosia* bed there have small Tentaculites in abundance.

Roll 3 pictures 2+3 *Stroph.* bed



July 15  
 Avery's Creek cont'd

7 Above the *Strophalosia* bed is a hiatus  
 27 of about 10', then 3' of soft slightly  
 1 3' calcareous and slightly gritty shale  
 6 This contains abundant fossils  
 2 2 as follows:-  
 3  
 10 10'

15" - Jy 15 f  
 6' hiatus Jy 15 a - 9'  
 sh - Jy 15 a  
 3" ls - Jy 15 a  
 1' 7" soft sh - Jy 15 c  
 4" ls - Jy 15 b  
 3' soft sh - abundant *Attheyistoceras* (Jy 15 a)

10' 10' Pond  
 Hiatus  
 - *Strophalosia* bed

*P. emarginata*  
*C. indenta*  
*P. tenuistria*?  
*A. bulbosus*

*B. spiniferoides* cc  
*Corals* cc  
*Bryozoa* cc  
*C. scitulus* r  
*R. penelope* r  
*S. marionatus*?  
*A. imbonata* re  
*P. rana* re  
*C. boothi* re  
*S. pennatus* c  
*P. iowanensis* re  
*Productella spin* re  
*S. grandis* re  
*M. subulata* r  
*S. concava* r  
*S. marquistiata*  
*D. lineata* re.

This shale falls to small fragments easily  
 This outcrop is 257 paces Urban road  
 intersection with Lakeshore highway  
 A specimen of *P. crinitus* found in the  
 this may belong here. (this bed called Jy 15a)

Jy 15 b - 4" bed of calcareous shale or ls.  
 little breaking into slabs + chips

Fossils

*P. rana* c  
*Productella*  
*A. imbonata*  
*P. iowanensis* - quite common  
*M. subulata*  
*S. pennatus*  
*S. rana*  
*C. boothi collitales*  
*R. cf. penelope*



July 15c 1' 7" soft sh - fauna

*A. spiculoides*

*L. contorta*

*L. pinnatus*

*C. scintillus*

*P. rana*

*C. brachy* } fragmental

July 15d - 3" Calcareous sh (ls.) - thin breaks into small flakes but makes a ledge in cascading creek.

*Lophobolites substriatus*?

*P. rana*

Small *Stentaculites*

*L. pinnatus*

*Hel. subalata*

*C. scintillus* (setigerus)?

July 15e - soft sh - slightly gritty - 6"  
*C. brachy* somewhat conchoidal  
*P. rana* cc. fracture.

Note - a few concretions were noted in bed July 15a down stream above 1<sup>st</sup> dam.

Beds here noted above are best seen just below second dam 250 yds from road intersection.



July 15 f - specimen with 4 *S. pennatus* + 2  
 lith. specimens belongs here. Shale, brownish  
 having the appearance of silty shale, slightly  
 gritty 15". Only *S. pennatus* noted.

### Avery's Creek

7' below Tichenor - bluish grey shale wet  
 and only slightly calcareous, falls to a  
 clay when wet! Fossils numerous but  
 only a few brachiopods are easy to extract.

Fauna

<del><i>A. spiniferoides</i></del>	<del><i>H. concinna</i></del>
<del><i>S. concinna</i></del>	<del><i>C. setigerus</i></del>
<del><i>A. reticularis</i></del>	<del><i>P. patulus</i></del>
<del><i>S. pennatus</i> - most abundant in stream bed.</del>	<del><i>S. pimplana</i></del>
<del><i>A. bulbosus</i></del>	
<del><i>C. scitulus</i></del>	

About 4' below Tichenor the shale has  
 many specimens of bryozoa flat ones  
 possibly *Cystodictya* (*Stictopora*)

Also here were noted ~~*P. flabellum*~~  
~~*P. rana*~~, ~~*R. fimbriata*~~.

The upper shales near the Tichenor  
 are red from pyrite weathering  
 The upper 2' of Ludlowville yielded

<del><i>S. pennatus</i></del>	<del><i>H. concinna</i></del>
<del><i>T. carinatus</i> - abundant</del>	Large <i>Spinifers</i>
<del><i>A. coral</i></del>	<del><i>A. reticularis</i></del>
<del><i>C. scitulus</i></del>	
<del><i>P. flabellum</i></del>	

Tichenor - fossils

*S. granulatus* - abundant  
*Mytilarica* large  
*A. spiniferoides*  
*Rhipidomella*  
*A. large* *Orthoceras*

} on upper  
 surface of  
 blocks



$$\frac{1}{8}'' = 650'$$

$$\frac{325}{76} = 108 \text{ yds.}$$

$$1740 \overline{) 10}$$

$$\frac{5200}{48} = 108$$

$$\frac{530}{1120} = \frac{140}{1260} = \frac{5280}{5280}$$

$$\frac{420}{1760} = \frac{21}{88}$$

$$\frac{630}{1760} = \frac{315}{880}$$

$$\frac{63}{172}$$

$$\frac{32}{86} = \frac{16}{43} = \frac{8}{21.5} = \frac{4}{11}$$

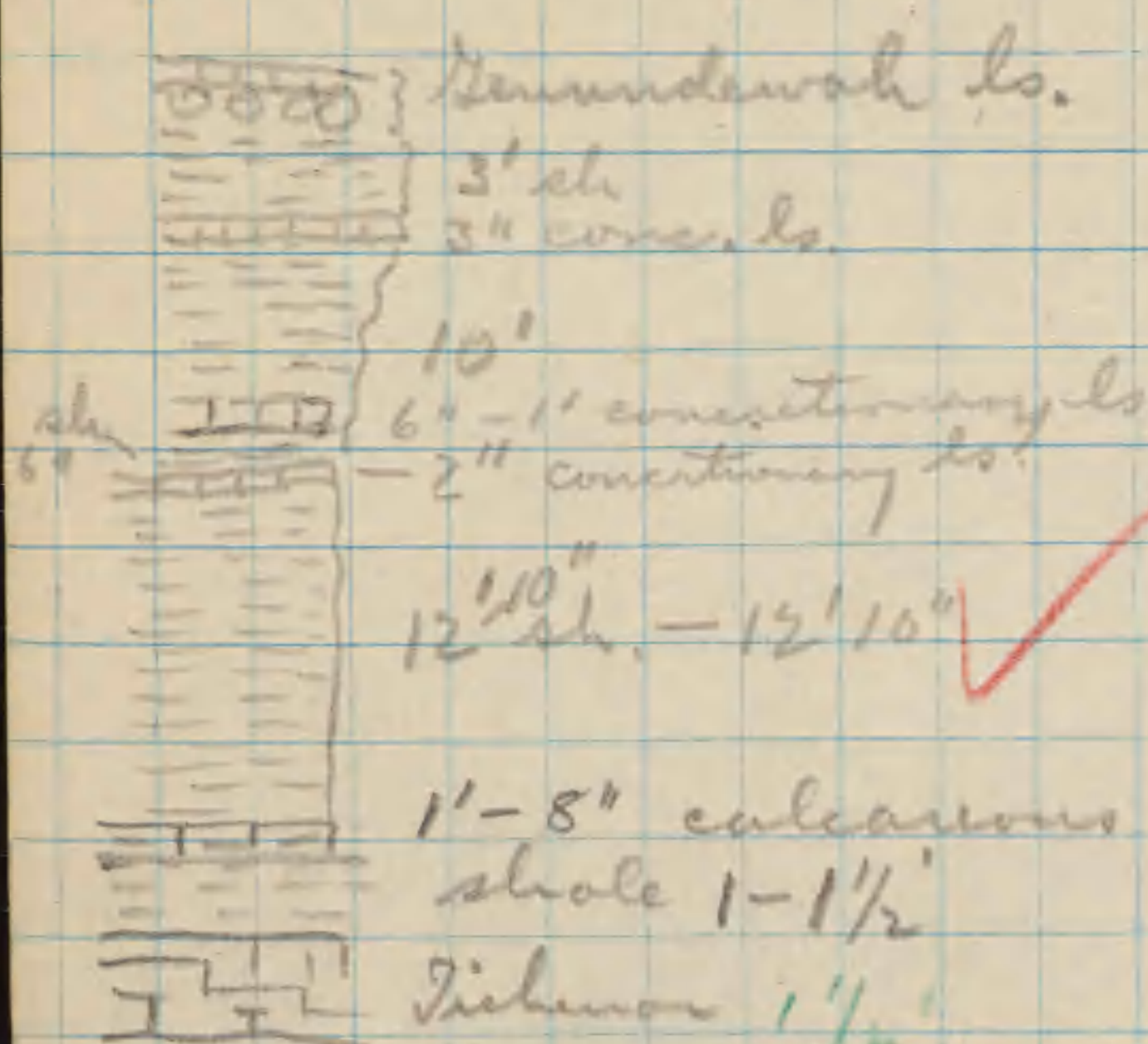
$$108 \overline{) 430 \text{ yds}}$$

$$\frac{1}{4}''$$



## Moscow

about 1' above



Tichenor is shale with  
*A. umbonata* c, *C. scitulus* c  
*A. reticularis* c, *A. spinosa*  
 Then follows about 8" to  
 1' of calcareous shale  
 with many corals (small,  
 many *P. rana*; *D. consobium*  
*S. pennatus*, *Palaeonilo*  
*tenestrata*?, *Pteronoplecter*  
*Rhipidomella varicosa*?  
*C. bicinus*

A set of joint here is N69W vertical and  
 irregularly spaced from 1 1/2' - 5' ± &  
 an intersecting set at S65W - vert. The  
 total thickness of the Moscow is measured  
 here as 26' 9" or 27'.

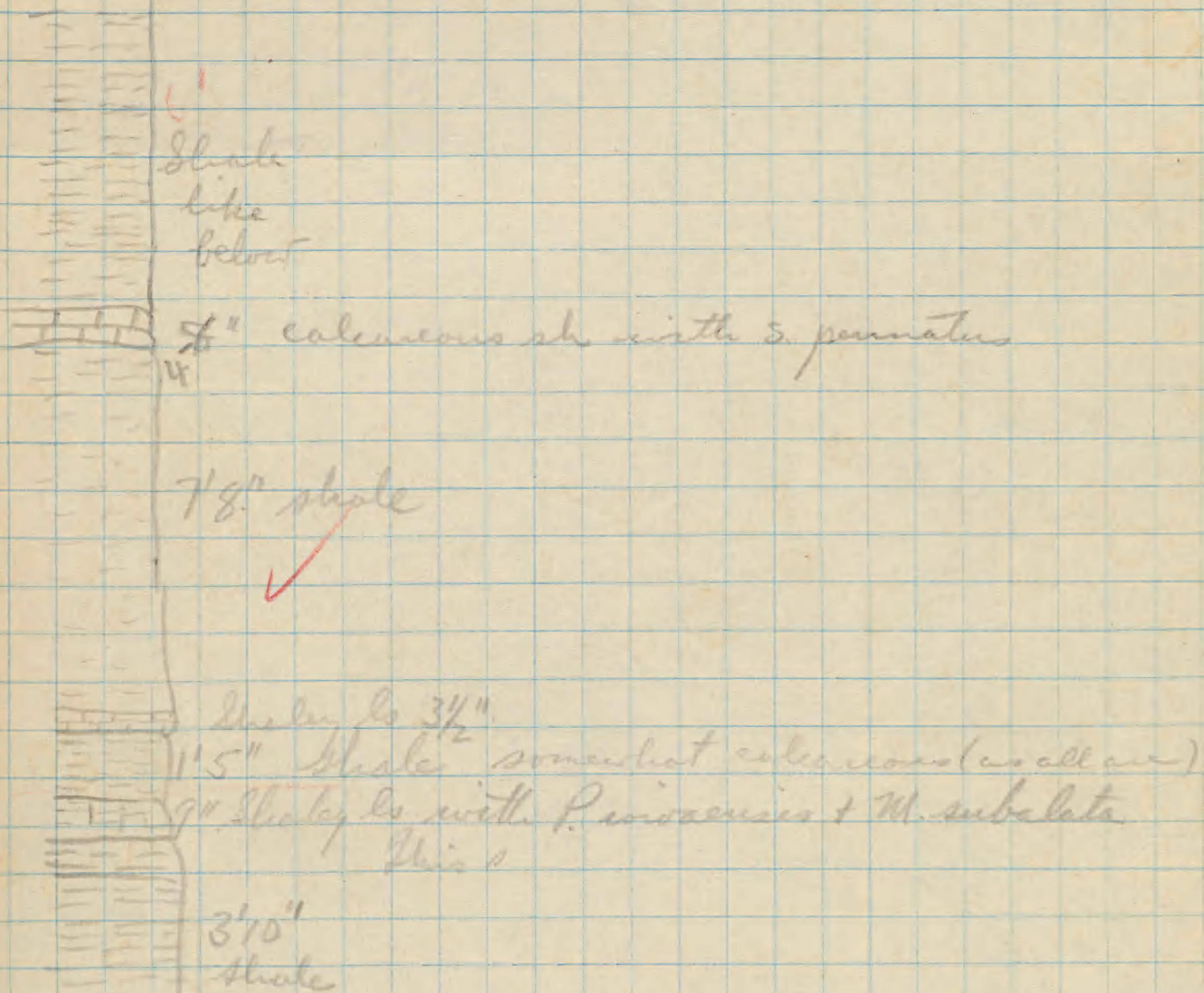
The shales from the top of the coral  
 bed up to 12' 10" are quite barren of fossils  
 except for *P. rana*. At 12' 10" there is a 2"  
 band of concretionary ls and this by a few  
 inches of sh (exact amt? not more than 6")  
 There then succeeds a band of concretionary  
 calcareous shale (ls) forming a cascade in  
 the brook. This is about 6" or a foot in  
 thickness, the exact amt. cannot be  
 ascertained. This had *P. rana*, *Chonetes*,  
*Spirifer subumbonatus*?

Between the upper <sup>(30)</sup> bed of concretions  
 and the Gerrundawah ls. fossils are  
 fairly abundant. The concretions do not  
 contain many fossils altho one had a  
 specimen of *M. subumbonata*? Fossils  
 occurring in the shales here are:-

*M. subumbonata*? *C. setigerus*  
*L. laura*?  
*P. rana*  
*S. Andaculus*  
*C. mucronatus*



## Wenatchee Cliffs Section



beach features 2'2"

*Platystrophia* bed  
Description: - The layer 3'10" corresponds to Jy 15a of Avery's gully and has *A. spiriferoides* + corals in abundance. The 9" layer is Jy 15b with *P. iowensis* + *M. subalata*. 1'5" shale is Jy 15c. Shaly ls 3 1/2" is same as Jy 15d, then sh. 7/8" corresponds to Jy 15e, 4-8 calcareous sh corresponds to Jy 15f. but is better exposed. The *S. pennatus* occurring just below this bed are very large.

joints have read N68E + N71E (to be corrected)

The *Platystrophia* bed occurs here 6' below the ls band with *P. iowensis* etc. it is exposed in the water and



appears to be ~~about~~ a thin band  
of ls. or shale. Fossils are numerous

*P. stylipora*

*A. spidifera*

*S. granulosa*

*S. perplanca*

*S. parvata*

*H. formosa*

*C. suberita*

*Actinopteria* <sup>clavata</sup>

Amoeb. stems

*Platyceras*

*P. curva*

*Diaphrosostoma*

Corals (up)

These exposures are  $\frac{1}{4}$  of a mile  
north along the shore from a small  
road leading down to shore, which  
leads from the main highway to  
the shore directly in front of the  
Wahmaka County Club. To locate  
take a line due <sup>north</sup> from the Wahmaka  
County Club and intersect it with  
shore  $\frac{1}{4}$  mile (500) back from the  
intersection of this line with the  
shore will lead to the Pleurodit  
beds







Tidemon July 16.

## Section at Lakewood

The lowest shale is exposed for only about 2' the rest being covered by 3' of talus. On top is a poorly defined band about 6" of shale more calcareous than that below so that it stands out slightly in relief. This sh. contains *H. permatus* and *P. rana*. This is probably the same shale as at Jy 15 f. Then follow 8 1/2' shale and then a 1 1/2' - 2" band of discontinuous concretions with *M. pygmaea*. The stone is quite compact. The plane the stone is lined on the seams with small gypsum crystals. This is succeeded by 8'5" of soft shale with chert nodules. The shales here contain *A. spiriferoides*, *L. permatus*, *L. laura*? One of the concretions had *M. laeta* in it. Also here are small structures with slickensided surfaces were found. 33' from the base the shale have fossils and this horizon was collected about 100 yds up the beach. Fossiliferous also.

<i>P. marginata</i> a.	<i>L. laura</i> a.
<i>S. perplanus</i> ac	<i>P. holichops</i> a.
<i>S. permatus</i> c	<i>T. curvatus</i> ac
<i>L. laura</i> c	
<i>P. punctilipus</i> c	
<i>A. spiriferoides</i> c	
<i>A. humbata</i> c	
<i>P. tenuistriata</i> ? a	

12'5"

10'10"

8'5"

8'5"

10'10"

12'5"

3' 8'20"

8 1/2'

6"

5'

8'6"

8'5"

10'10"

12'5"

3'



Many of the shales contain  
lens pointed concretions of irregular  
shape.

12 1/2' of shales follow then  
comes the Tichenor ls 10" thick  
2' below Tichenor a *spinosus*  
and *A. reticularis* are present.  
The Ludlowville shales has exposed  
here are not calcareous, except  
for the concretions.

### Moscow Division

On the Tichenor are 10 1/2" of shale  
with many *Cystiphyllum* and  
on this comes a 2" band of ls.  
with *A. reticularis* and *spinosus*.  
This is followed by shale in the  
bottom of which, just above the

Uppermost 2" band of ls and small corals  
like those found above the  
*S. consobrinus* zone in Aveny's.  
The shales here are slightly  
calcareous. At the top of the Mos  
at the 4th step (22') the shales  
have *M. subumbona*? and  
actually *C. scitulus*. There are at least  
measured 5' more of Moscow actually  
measured. The Gemunderwah  
comes in here in about 3'  
2" ls more, making a total of about  
10 1/2" shales with *Cystiphyllum* 27'-30' for  
Tichenor 10" the Moscow

The *M. subumbona* may be *A. praecursor*  
either case Shaban says they are  
found just below the Gemunderwah,  
1' below for *M. subumbona* + 2' below  
for *A. praecursor*.



## Walden cliffs

Only Ludlowville - not examined thoroughly

## 18-mile Creek

## Section west of highway bridge

The bed of brook is a limestone ledge that forms a shelf in the water. This bed contains

<i>P. iowensis</i> ✓	<i>D. lividus</i> ✓
<i>A. umbonata</i> ✓	Coral ✓
<i>C. tenuicinctus</i> ✓	<i>M. subulata</i> ✓
<i>P. constricta</i> ✓	<i>Platyceras</i> sp. ✓
<i>Orbiculoides</i> ✓ sp.	<i>Palaeoneilo</i> ✓
<i>Phacopora</i> ✓	
<i>B. leda</i> ✓	<i>C. scitulus</i> ✓
<i>C. boothi</i> ✓	

According to Grabau this is one of the Trilobite beds (Lower). It is <sup>about</sup> 6" thick on the creek.

Next above this ls is a shale bed 11" thick containing: - *P. rana*<sup>cc</sup>, *S. pennatus* c, *I. carinatus* r, *A. spiriferoides* r, *A. umbonata*, *Palaeoneilo* sp., *C. scitulus*

This is followed by 4" of hard calcareous stone which is somewhat gritty. This stone forms a ledge in the stream bed along the cliff. Here are found *S. fissurella*, *C. boothi*, c, *P. rana*, *Aulopora*, *S. pennatus* c. Fossils are not as common in this bed as in those below. *Spyroceras*, *B. leda*.



Section on 18 Mile Crk.

Tieler 10'-1'

40' shale  
with  
concretions

32'

ls. with *S. pennatus*

7' 6"

4" ls  
11" shale

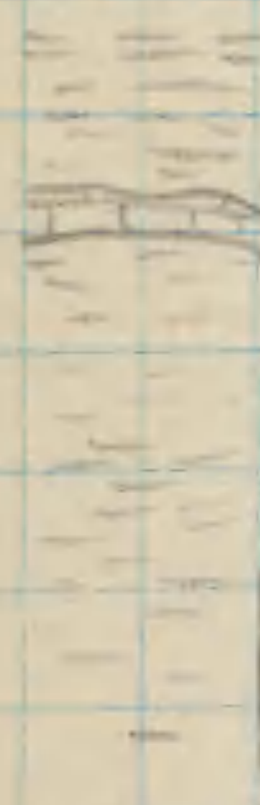
ls 6" with *P. isomorphus* - lower Trilobite bed



Then follow  $7\frac{1}{2}'$  shales with  
*Spyroceras nuntium* *C. bellistriata* ✓?  
*S. pennatus* Ostracoda  
*P. punctilifer* ✓ *A. umbonata*  
*P. rana* ✓ *C. scitulus*  
 Small tentaculites

These shales in the lowest 1 ft. are somewhat calcareous and form a third ledge on the stream bank. They have in this lower 1' many individuals of *P. rana*.

There follows a calcareous sh band of about 8" with many *S. pennatus*. Some have very long wing points. The only other fossil noted in this band is *P. rana*. About 40 (or 45") of Ludlowville are exposed above this bed on this side of bridge section 50 yds. Upstream from highway bridge.



Mass?  
 Tichenor 10"-12"  
 sh. with  
 28' concretions

Summerville Section 350 paces - 875' upstream  
 Photo 5, roll 3

17' (not measured here)

15" Above the Tichenor  
 - Tichenor 1'-15" is a band of *Cystiphyllid*  
 corals. Above this is  
 24' a 2" band having *Streptelasma*?  
 in it. An *Ambocoelia* zone  
 rests on the Tichenor



Fauna of Ludlowville 13' below Tichenor  
 & in an interval of 5'. Here the shale  
 breaks in larger masses, and is not  
 calcareous. This is the same horizon as  
 seen at Lakewood. Fossils here are:

<i>C. boothi</i> r	Ostracoda
<i>A. umbonata</i> cc	<i>Schuchertella</i> or
<i>P. rana</i>	<i>R. vanuxemi</i> or
<i>Spennatus</i> cc	<i>Aulopora</i>
<i>L. laura?</i> c	<i>Productella</i>
<i>A. spiriferoides</i> rc	<i>Cunoides</i>
<i>D. lineatum</i> wr	<i>Pholidops</i>
<i>S. perplana</i>	<i>Byozoa</i>
<i>Tachypora</i> r	<i>Cystina hamiltoniae</i>
<i>T. carinatus</i> r.	

A great resemblance to the soft Eaton shale  
 Moscow sh 18 mi E.

Lowest shales at contact are crowded  
 with *Ambocoelia*, & in these are also

*A. spiriferoides*  
*D. consobrinus?*  
*S. perplana*  
*S. pennatus*

Upstream about 1/4 mile the Tichenor  
 has become thicker & is here 20"  
 thick. The upper surface often contains  
 many fossils, as large *Mytilarca*,  
*A. pithaps*, *R. fimbriata*, *P. flabellum*,  
*C. indenta*, *D. lineatum*, *Platyceras*,  
*Corals* & *Byozoa*, *S. granulosus*, <sup>*A. decussata* *M. coarctata*</sup> Sometimes  
 This upper surface has strings or  
 branch-like masses of pyrite. Huge  
 heads of *F. hamiltoniae* often occur  
 crowded in the rock and at any  
 horizon it. 2' above the Tichenor  
 is the zone of *Cystiphyllum* and *Atrypa*  
*spinosa*. The section is exactly 17'  
 thick here. Just below the Genesee



is a 3" shaley band of rather calcareous shale. Below this there are 3" of shales like the Moscow below and below these 2" of concretionary ls. I was not able to work out the zones of the Moscow clearly at all. Above the *Cystiphyllum* & *Strophelasma* zones fossils, everywhere that I have examined the rocks are rare. The *M. subumbona* was here again

Gemundewah ls. 1'-15"  
sh 3" dark brownish  
ls. 2" bluish grey

15'

*Cystiphyllum* zone  
*Ambocoelia* zone

Tichenor

found 2-4' below the Gemundewah ls. This and a small *Chonetes setigerus* were the only fossils noted.



July 17

Species observed in the Tichenor  
on about miles of lake shore  
south of 18 mile Creek.

*P. obiformis*

*S. dermussa*

*C. boothi*

*P. rana*

*R. fimbriata*

*S. granulosa*

*Platyceras* sp.

*S. laticatum*

*Modiomorpha* sp.

*P. iowanis*

Favosites

clinging to Tichenor

*Cryptonella* ?

*Urtrocha scalina*

*S. coelocera* (jania) ?

*Hederella*

*D. sculptilis*



Section measured at Highland  
on the Lake up the stairs.

118' to top of hill

The Ludlowville is for the most part covered by talus and beach; the Tichenor is 15" thick and here contains large heads of Favosites. There follows on the Tichenor 27"

West R. shale 16"

8' or 8 1/2" brown sh

sh 5' 5"

ls 1 1/4"

sh 4' 5"

2" ls

2 7/8"

Tichenor 15"

of shale. Cystiphyllum occurs 18" up from the top of the Tichenor. Then follows a 2" layer of discontinuous (here) concretionary ls.

4' 5" from this band is another like it but only 1 1/4" thick. On this are 5' 5" of somewhat calcareous shales with P. rana, then a 4" band of concretionary limestone. On this an 8" band of calcareous, gritty, chocolate brown shale, the base of which has crinoid segments in it. Then follows 8" Gannadawah

33' Ludlowville

Talus and beach about 15'

ls.

H & O level



$$\frac{\begin{array}{r} 375 \\ 3 \\ \hline 1125 \\ 5280 \end{array}}{5} = \frac{1}{5} \text{ mile}$$

$$880 \text{ yds} = \frac{1}{2} \text{ mile}$$

$$440 = \frac{1}{4}$$



Section <sup>1125'</sup> 500 paces on shore south of highland on the lake - show stone case

West River shale	On the calcareous band below the 8" brown sh were found a trilobite pygidium + a small shell possibly <i>Asymbiota</i>
8" Genesee sh compact calcareous band (3")	In the ls. above the brown shale <i>Leignin spatulata</i> was discovered?
11' 8" Moscow shale	The shale between the Genesee and the Moscow when rubbed on a rough surface leaves a brown streak; the Moscow leaves a white streak.
Tichenor 15"	
7' Ludlowville	
15' talus	
5' beach water level	

The west River and Portage shales continue up the side of the hill for about 50'. All of the shale above the ls band with *L. spatulata*? is fissile and ~~black~~ containing large concretions. Jet black shale on the West River is the Middlesex sh then come the Cashagua shales with large concretions.



650 paces south of highland - only  
bottom of Moscow examined 3' above  
Tichenor

concretionary ls 2"  
4" sh. with *Streptelasma*  
shaly ls. with fossils 4"  
17"  
Tichenor

In the shale on top of the Tichenor there  
are many *Ambocoelia subovata*; with

*C. microhatus*

*Phacops rana*

*C. vicinus*

*A. spiniferoides*

About 15" up corals occur then a 4"  
band of ~~shale~~ ls. impure ls. with

*C. reticularis*

*Meristella*?

*Platystrophia*

Corals

*Orthis loides*

*S. pinnatus*?

*P. rana*

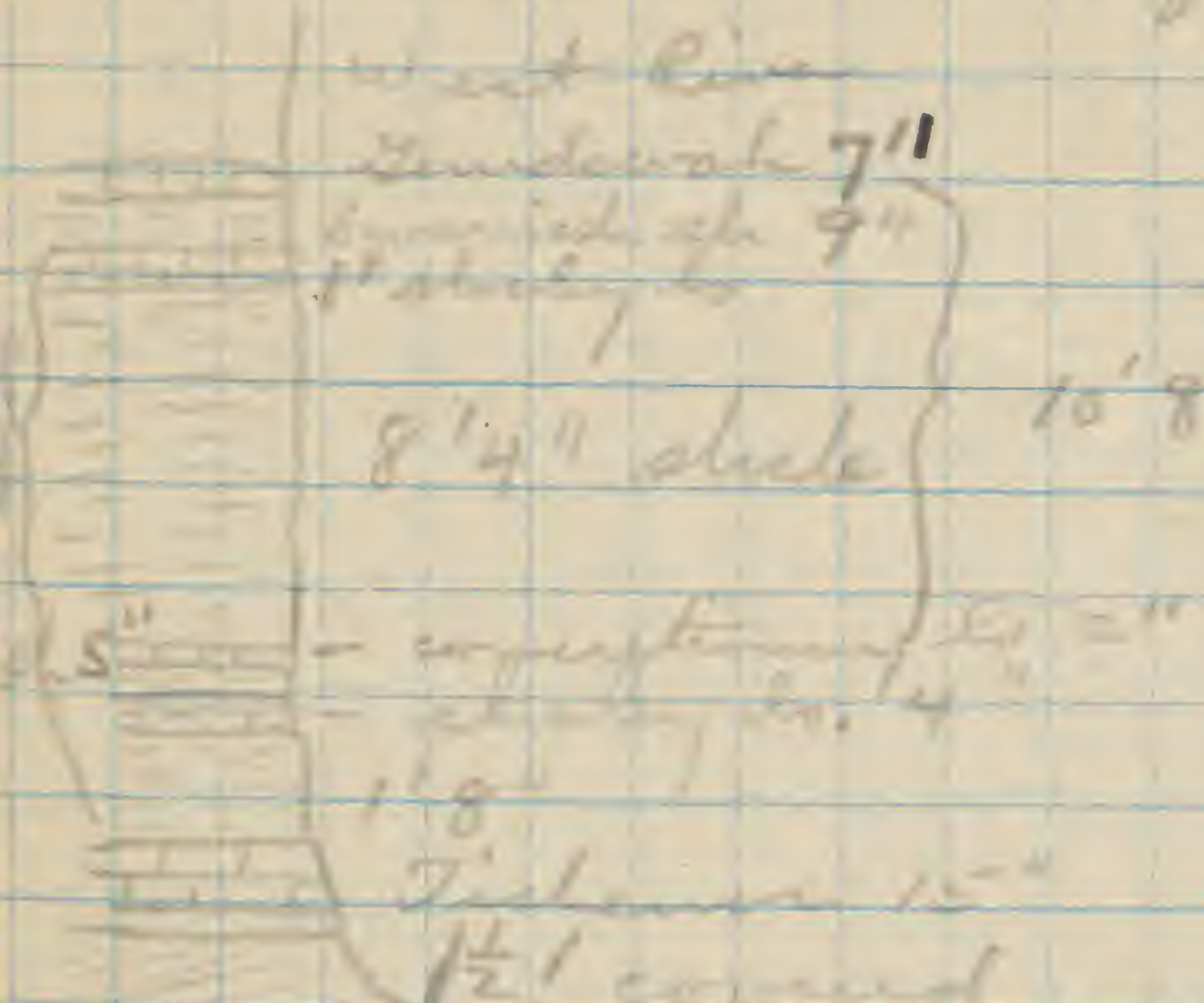
Then comes shale 4" with *Streptelasma*  
then a 2" concretionary ls. with a *Pelecypod*







Section 1632 paces south of Highland



The upper surface of Tichenor blocks here are crowded with Myctarosa shells.

In the lowest calcareous shale band of 4\"

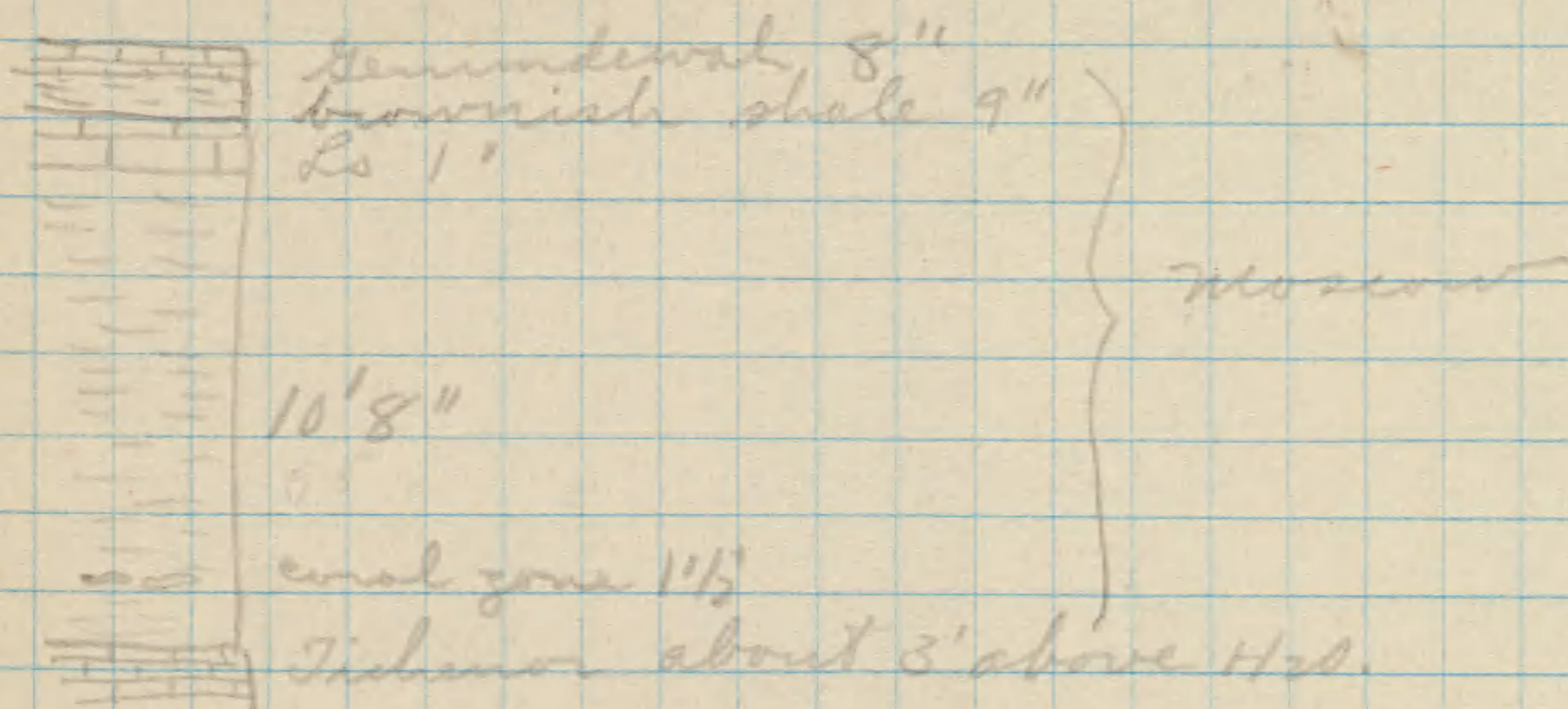
*P. consobrinus*, *Pholidops*, *Romulus*, like those in same band as at Avery's, also the shales just below the 1' ls band under the shale below the Glenview sh were found *P. rostrata* and *C. mucronatus*.

54 paces south (1686) the first 3\" of shale on the Tichenor had few fossils then came a foot of sh. with *A. uncinata* crowded, packed in, & also *A. spinifrons* & *C. mucronatus*. Just below the ~~shale~~ ~~the shale~~ ls were found *Cystiphyllum* corals & (*Eudiphyllum*?) *Stylophora* is above & also in the band. The 2\" concretionary layer is absent here. *A. spinifrons* <sup>very small</sup> several small, *Platysma* *articulata* <sup>1/2</sup> + *D. consobrinus* & *S. pernatus* were also found. Also the shale above this *S. pernatus* was seen.

The *Cystiphyllum* *Thyrea* zone is exactly below the 4\" ls band. *Eudiphyllum* of *C. phantus* corals common in the 4\" band. In this 4\" band a *Cystiphyllum* *vesiculosa* 2\" in diameter was found.

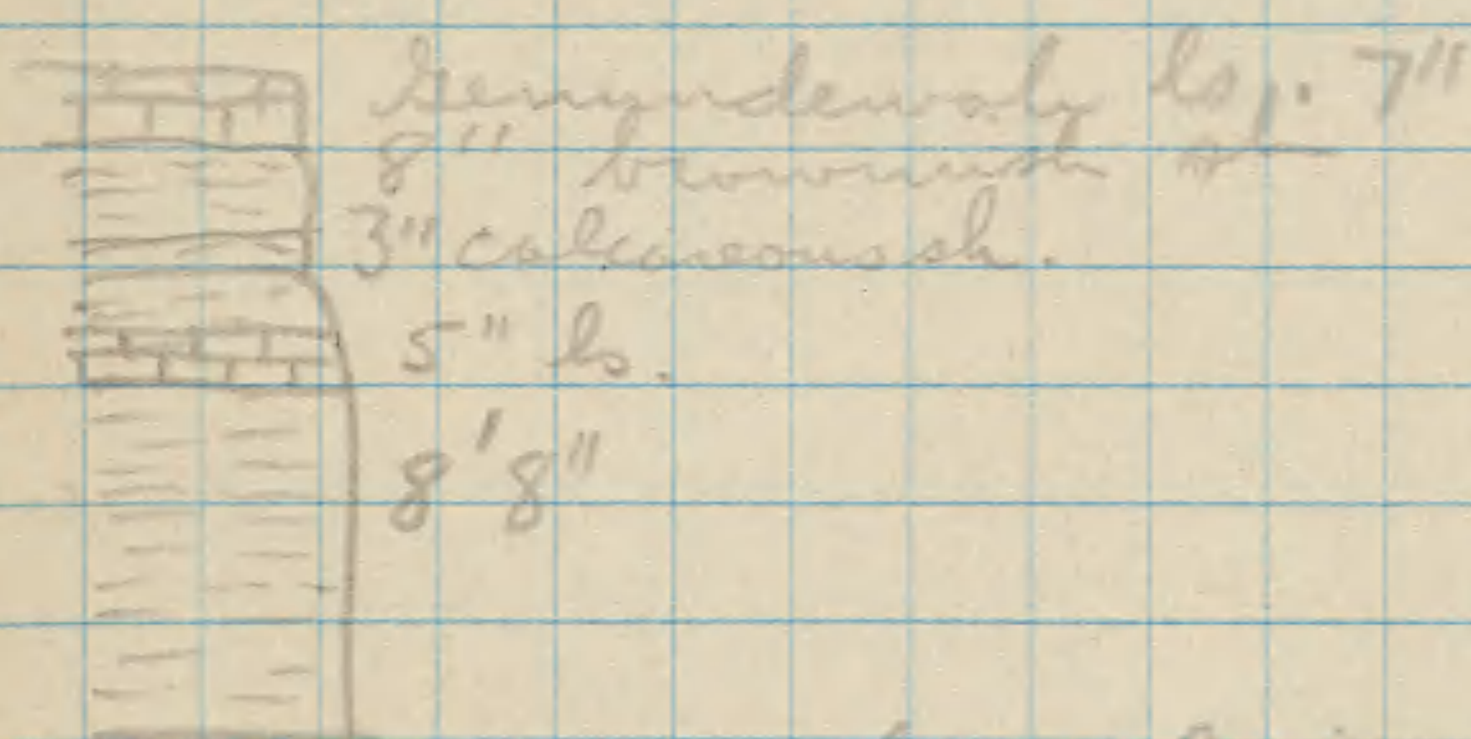


1710 paces South of Highland



About 1 1/2' above coral zone were found *A. umbonata*, *A. spiriferoides* and a small *Spirifer*, quite probably *S. tullius*, & a *prosubumbona* (*M. subumbona*)? The calcareous band here has disappeared but the corals mark the horizon.

2080 paces South of Highland

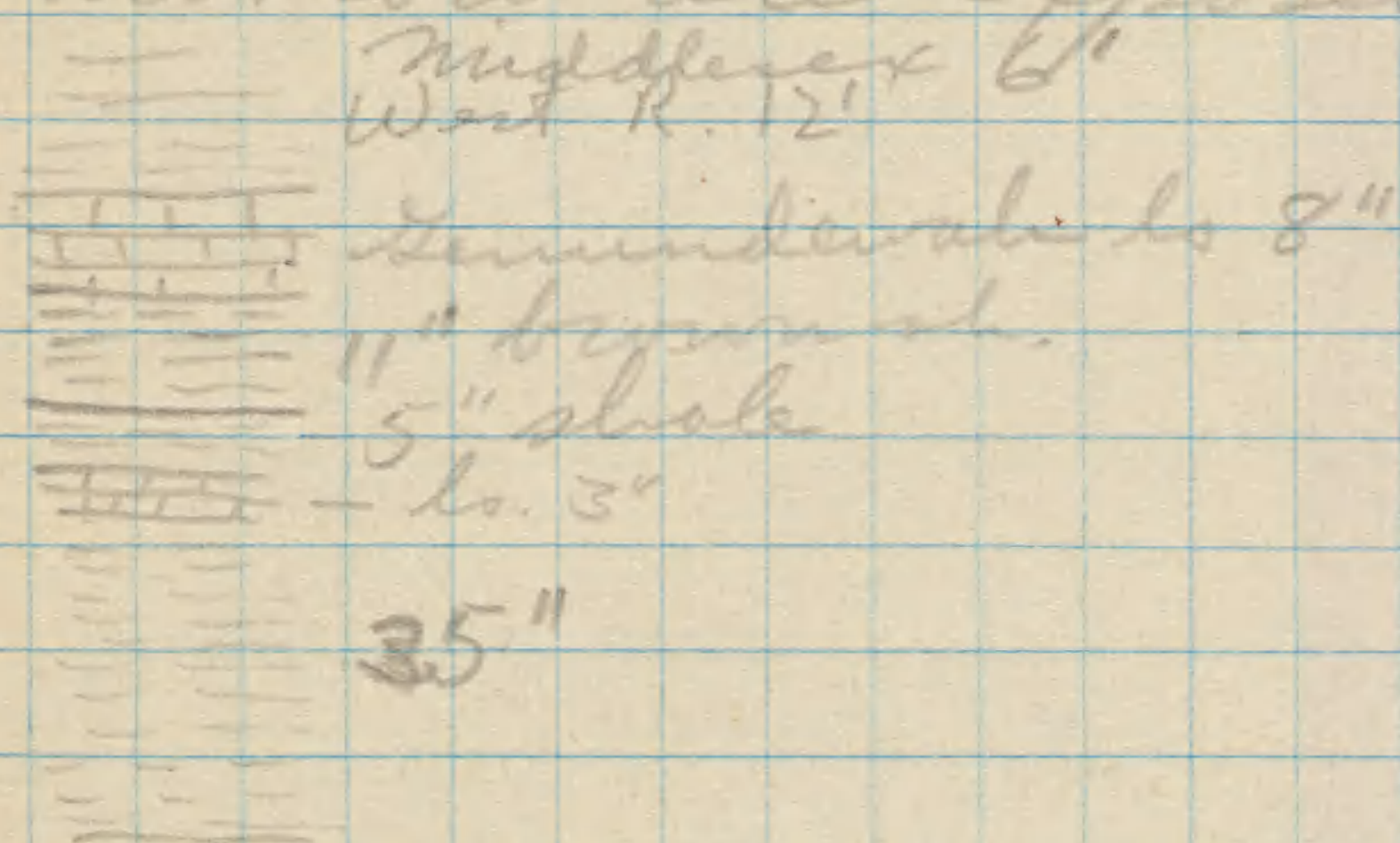


*Lichenon* - a bench in the water

2650 paces below Highland the "Moscow" is 9' 7" thick and the *Lichenon* is about 6" under water. The band below the brown shale is 6" thick & there are 6" of <sup>calcareous</sup> shale between the two.

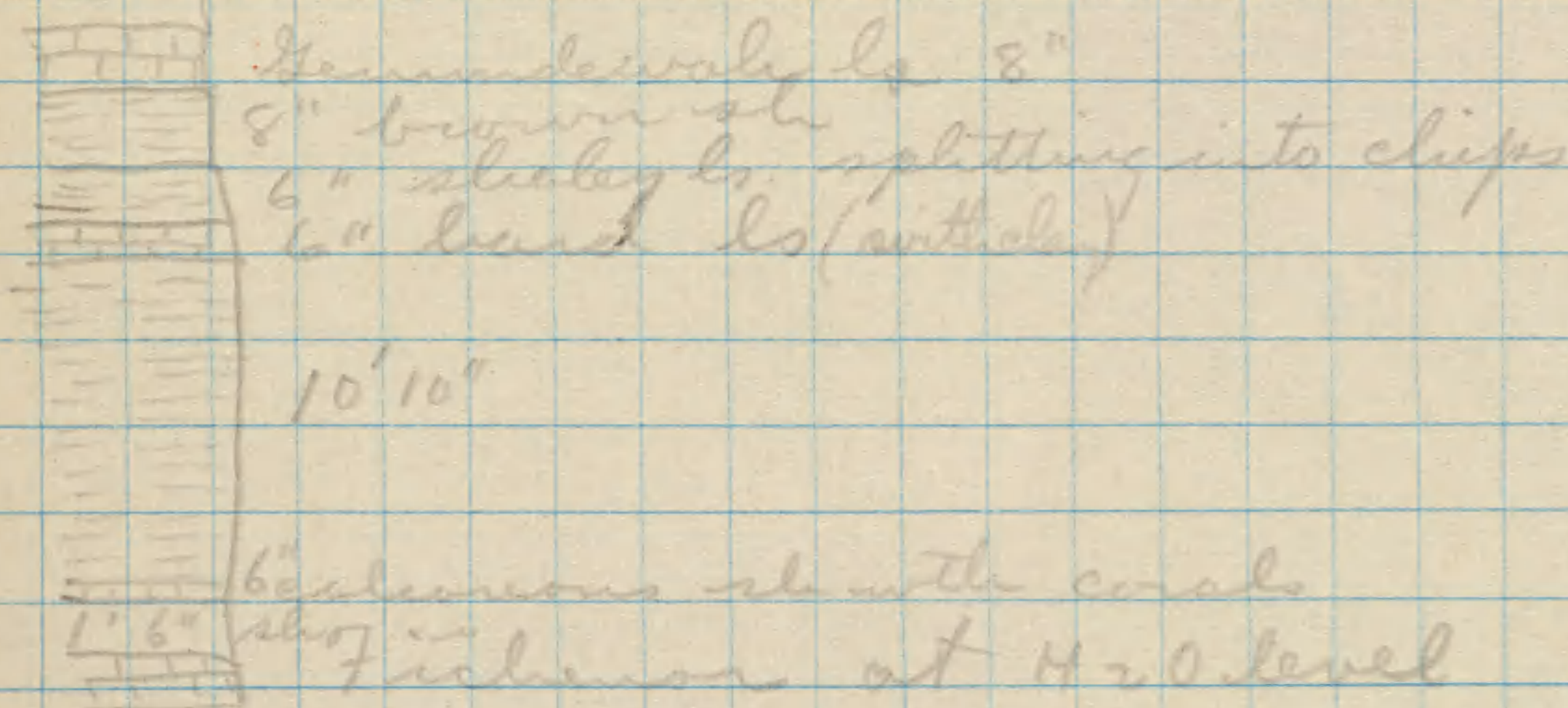


3100 paces below Highland (500)  
below Chalk outlet only  $3\frac{1}{2}'$  of  
Moscow are exposed



2' 4"  
3'  
5' 10"

Section at Mouth of Creek  
2600 paces from Highland  
West R. sh.



5'  
3'  
1' 6"

6" calcareous sh - with corals, directly on Cyst. zone  
1' 6" shale with *A. unborata*, *C. verrucosus*  
Fischer at H<sub>2</sub>O level  
    *A. reticularis*, *S. pinnatus*,  
    *Cystiphyllum*, *S. arduum*



434

434

The coral-bed is well exposed in the  
bed of Pike Creek where it enters the  
lake.



July 20

Pike Creek.

1928

Measured from top of Morse Creek, Moscow shale is  
 10' 10" thick + 50 note-book squares = 11' 7"

1- Fossiliferous zone between Tichenor and  
 4" calcareous sh. with *Strophomena* — This  
 interval by hand level appears to be about 2"  
 thicker than length of hammer<sup>(17")</sup>. Shale in contact  
 with Morse Creek for 2" few fossils but at top of the  
 2" *A. umbonata* abounds. Fauna in lower 3" —

*A. umbonata* a*C. mucronatus**R. vanuxemi**D. inaequistriata**L. perplanus**G. spiniferoides* re*P. rana**Cyrtina* large or

Next 4" — *A. umbonata* abounds, and fauna  
 like that below. *C. boothi*

Uppermost 3" of this bed very fossiliferous,  
 shale between upper 3" + lower 7 not very fossiliferous  
 fauna of upper 3".

*A. umbonata* a*H. livalli**Coral* c (*Cystophylloids*)*C. sappho**A. spinosa* re*A. tubularis* re.

Coral bed 1-2" thick

*A. Andacula* re.*D. sculptilis* re.*D. inaequistriata* re.*R. vanuxemi* re.*C. vicinus* re.*C. mucronatus**P. rana* c*Pholid.* large



## Section on Pike Creek

Hermandera Is.

4148<sup>11</sup>

84

8

50  $9\frac{3}{4}$  inches

9.3/11

brown sh  $9\frac{3}{4}$ "

7

57 11" above

11

shaley ls. 11" 6

$$\begin{array}{r} 14 \\ 3 \overline{) 262} \end{array}$$

262 sq.  
4'3"

 $4'3''\frac{1}{2}$ 

5

28 Aug. 54

shale ls. 5" 4

$$5^1 5^1 - 106$$

ag. 3190

Aug. 31 911

shale 3' 9" 3

32 2964

shale ls } 6" 2  
cral bed }

5' 5" - 9  
1' 9" of.

1' 9N of.

Delthyris zone 1.

Moose Creek is at Lake-level

$$\frac{26}{26} \cdot \frac{26}{26}$$
 $8\frac{1}{2}$ 
$$\begin{array}{r} 6 \\ 3 \\ \hline 48 \end{array}$$

12, 51, 64

12' 10"

44262  
264

$$C_1 s^{-1/2}$$
$$\begin{array}{r} 5' \\ 8 \\ \hline 13' \end{array}$$
$$\begin{array}{r} 44 \overline{) 234} \\ \underline{220} \phantom{0} \\ 140 \\ \underline{132} \phantom{0} \\ 8 \phantom{0} \end{array}$$

(3. 5)

$$\begin{array}{r} 44 \overline{) 106} \\ \underline{88} \\ 18 \\ \underline{44} \end{array}$$
$$\begin{array}{r} 2.4 \\ 8.5 \\ \hline 120 \\ 192 \\ \hline 26. \end{array}$$

18<sup>th</sup>

65  
20  
1.5

$$\begin{array}{r} 41.2 \\ 44 \\ \hline 168 \\ 68 \\ \hline 21848 \end{array}$$
$$\begin{array}{r} 65 \\ 44 \\ \hline 21 \end{array}$$
$$\begin{array}{r} 5.3 \\ 8.5 \\ \hline \end{array}$$

203, 12/49.05 (5.5")  
419



2. *Strophomena* zone - 4 to 6" - shaly ls.

*S. angularis* c.  
*S. rectum* etc.  
*S. vancouverensis*  
*S. rana*

*A. reticularis* c.  
*D. sculptilis* c.

Thickness of this zone varies but *Strophomena* does not range much above 4" above top of coral bed. Coral bed not more than

3. Blue shaly ls. containing very few fossils - *Orthis* and *Orthis* most common

4. Shaly ls. - little hard shaly ls. to irregular flat pieces of light ash brown color - *Strophomena*, *Orthis* or *Orthis* etc. One inch or two of this ls. is locally very hard.



5. - shale crumbling to thin blue chips -  
*J. carinatus* - small, *C. setigerus*  
*Ambocoelia*. The *Ambocoelias* appear to be  
 umbonata and are mostly crushed.
6. Shaly ls. - middle 3" very hard and a true ls.  
*S. fissurella* *C. setigerus*  
*P. rana* *Ambocoelia* (*proumbona*?)
7. Brown shale caps the ls. bed but in places  
 thin layers of *Strophomena* ls. are in contact with  
 bed 6. *Strophomena* layers & lenses are frequent. *Petrostema*  
 odor prominent.

Pike creek section consists of one foot and  
 inches of very fossiliferous shale  
 representing shale from *Ambocoelia* beds to  
 base of *S. corallina* zone. There follows 4-6" ?  
 of calcareous shale representing, perhaps,  
*S. corallina* zone. Shale above this is  
 mostly barren, but contains some limestone  
 layers. The section closes with  
 shaly ls. nearly devoid of fossils. Brown  
 shale above it may be *Bechea* but is not  
 like it lithologically.



July 24

Oven Creek.

In contact with the Tichenor is 2" of sparsely fossiliferous shale, and then comes the Ambocoelia bed. There are 21" between top of Tichenor and base of Strophomena bed. The Strophomena bed is about 6" thick and abounds in fossils.

*D. insignitatus* r  
*P. rana* c

*D. concobanus* r

*S. ungula* c

*C. bothi*

*S. rectum* c

*A. reticularis* r

*R. vanuxemi*

*A. spiniferoides*

100 paces about 3' above the Strophomena bed a few specimens of *D. sculptilis* were seen in the otherwise barren shale.

135-200 - soft grey shale -

*A. andrews*

*P. rana*

*A. reticularis*

*Pholid. lam.*

*S. ungula*

*R. fulvata*

*A. spiniferoides*

*L. parkana*

*D. sculptilis*

*D. media*

*L. laura*

*A. umbonata*

*C. micronatus*

*R. vanuxemi*

*C. pudenta*

*C.*

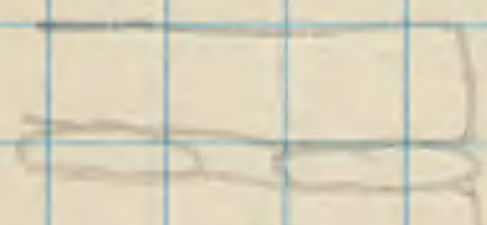
This bed is about 8' above the Morse Creek

At 452 paces is a 3' cascade caused by thin concretionary bands in the shale. No fossils were seen from the fossiliferous layer 10' from the base to the thin concretionary layers.

Photo of Ambocoelia bed in Tichenor is really Strophomena bed

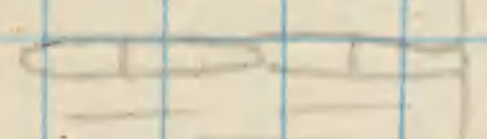


# Moscow section Avery Creek



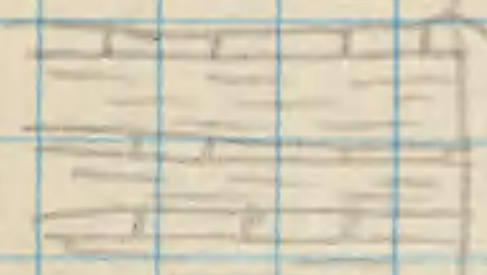
Gemmulograna ls. 7" 4-6" 10-10" of shale

shale 4'



concretionary ls. 2"

shale 7 1/2'

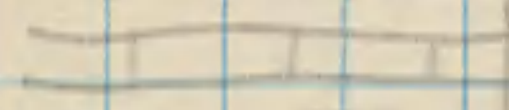


concretionary ls. 2"  
shale 1"  
concretionary ls. 2"  
shale 1"  
concretionary ls. 1"

fossils appear

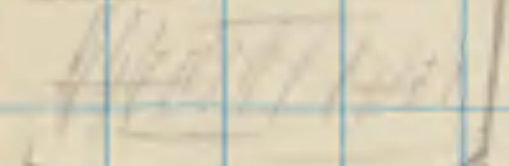
20' shale

20' fossiliferous zone



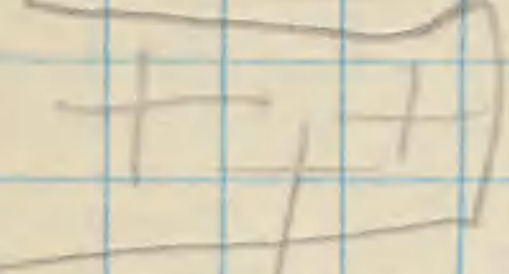
shale ls. Strophomena bed 5" =

a spinosa



Ambocoelia

21" = 1' 9"



Morse Creek



Fossils appear in the second concretionary layer but are rare.

*P. rana*      *Orthis* sp.

*Ambocoelia* occurs in the shale between the second & 3rd concretionary layer. In the 3rd concretionary layer is *A. praecumbona*, *A. umbonata*, *P. rana*,  
*P. rana* c,

In the  $7\frac{1}{2}$ " of shale between 3rd concretionary band and the upper 2" band were seen

*A. praecumbona* c

*A. umbonata*

*C. univesiculatus*

*C. scutellus*

<sup>plough</sup>  
 In places 10" of shale intervene between the uppermost layers of concretions and the *Gemundewa*. The shale above the thin concretionary beds has a purple cast to it. The *Gemundewa* comes at about 650 paces above the Morse Creek.

One of the concretions below the *Gemundewa* has

*M. subula*

*O. media*

*L. luma*

*A. praecumbona*



## Buffalo Creek

Section about  $1\frac{1}{4}$  miles upstream from Blossom. Exposures examined 300 paces downstream from Bridge. Phacelotinus bed is about 22' above stream level at 300 paces. The Phacelotinus band is a hard impure limestone about 6" thick. Phacelotinus is quite common. Other fossils are -

*N. triguttatus* *E. lepidus*  
*D. subulatum*

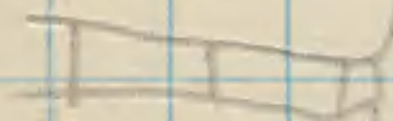
At the bridge it is at the elevation of the bridge, about 700' A.T.

Phacelotinus bed is <sup>in stream</sup> at 300 paces upstream from abandoned road. 31' above it is ~~two~~ or three layers of concretions. The exact identity of these could not be determined but they are probably at about the horizon of the *Strophalosia* bed

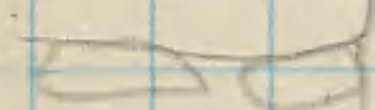


soil

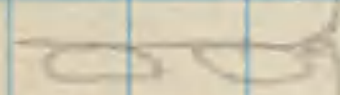
shale 10'

 ls. 6" Phacelites bed

shale 11'

 concretion

shale 5'



shale ~~4~~' 3' 9"



~~shale~~

shale 3'

stream level



4400





July 18.

Lancaster N.Y. — Stafford Is. Cayuga Cr.  
Lake

Under the <sup>Lake</sup> Avenue bridge a 10" layer of very hard ls. which is very fine grained and grey. Fossils here are *Amboecia*, *C. mucronatus*, *S. dimidiata*? Upstream and between the two bridges just below the dams. are 2 layers of ls., the lower one downstream 40" thick, the upper one at the dam is of 2 layers amounting to 1'. Thus about 22" of ls. are exposed between the two bridges. On the uppermost bed under the street-car bridge there is a 2" layer of calcareous shale with crinoid stem segments and *C. mucronatus*.

Stafford Is.

275 paces below the Court Street bridge <sup>in bed of Plymouth Crk</sup> were found small outcrops of Marcellus shale below the Stafford Is. The thickness of the Marcellus exposed here is about 1'-2'. The stone is not the typical black fissile shale with paper thin bedding but is dark grey some of it weathering brownish. It has a conchoidal fracture and concretionary structure. 200 paces below the Court Street bridge the shale is black with a concretionary structure and is calcareous.

The upper shales below the Stafford is gritty and more compact and is very calcareous. It may be called a calcareous shale. The stone here



12

9



is also quite fossiliferous. The species observed are:-

*Lunulicardium curtum*

*L. hintaris*

*Orthis* (probably *Gussonoceras subulatum*)

*P. fragilis*

*N. triquetra*

*P. lincklaeni*

*C. mucronatus*

*A. umbonata*?

One of the layers is a limestone 1" thick (150 paces) directly below the lowest layer of the Stafford noted which is <sup>passes</sup> downstream, the Marcellus <sup>1 1/2' thick</sup> is a soft brownish grey shale. The total thickness of Marcellus exposed must be 3-4'.

The lowest bed of the Stafford is 18" thick and is a hard grey ls. crowded with small *Ambocoelids*. Also present here was *C. scitulus*. This first bed is 18" thick. Then follows a bed 19" thick in the lowest portion of which occurs corals in the shale parting. These next 6" are compact & hard then the rest is composed of ls that appears hard but when struck falls to flat plates. On the pocket (solution) surfaces of these blocks the partings between these plates appear like contours. In places the rock has a decided concretionary structure. In the ls. which breaks into plates well preserved specimens of *C. scitulus* are very abundant.

The uppermost bed exposed is just below a small blake about 50 yds from street bridge. It is hard and compact and has many fossils



It is a grey ls, with a flinty fracture. It was not possible to land level this ravine with the result that the thickness could not be measured. Further gives it as 9'5" which seems high. I would make the layers exposed here 5'6" to 6' in thickness. Probably all of the rock is not now exposed. Thin layers of shale are found between the partings of the major beds.

### Cardiff sh.

at the junction of Little Buffalo and Cayuga Creeks there is shale in the creek bed but above this a stratum of rather hard ls. forming a ledge. This layer is probably the same as that which divides the Cardiff from the blennestels at the Erie Lake shore. The shale here is calcareous. The shale in section is a dark grey and is about 6" thick. The ls. is about 15" thick. Fossils observed in the ls are:-

*P. rana*

*S. pennatus* ✓

*Styliolina* ✓

*S. subulatum* ?

*Al. umbonata* ? ✓

*P. leicata* ? ✓

*L. lamna* ? ✓

*C. boothi*

a set of joints spaced about 5' here reads N 72 E and an intersecting set, less regular reads N 22 W. The shales above the ls are darker in color than those below. Correct



Whenever the ls has been exposed to the weather it crumbles to small chips and thus leaves a very irregular surface. About 3N of shale is exposed above the ls in the creek upstream from the highway bridge. It is brownish gray in color and when struck with the hammer it leaves a brownish streak on paper. It is quite calcareous with acid. Large rectangular blocks in the streambed brought from above are of a similar kind, showing the nature of the rock above.



July 31.

Le Roy

Onondaga - exposed below the second RR bridge downstream from the dam at Main Street. Shaly brownish limestone abounding in typical Onondaga fossils right within 6" of the contact.

Stafford and Marcellus.

Stafford exposed in the dam about 3' above the level of the water. Exp. consists of 11" hard grey ls. with a smooth or subconchoidal fracture. Frequently splits with a splintery fracture. Color when weathered is chocolate brown or light brown. Below the heavy 11" upper bed is 7" of brownish grey ls. splitting into flat pieces. Then 7" grey shaly ls. weathering to an ashen color. This layer abounds in *S. truncata* and *A. nana*. Below it is 7" black fissile shale containing *L. fissinella*, *C. lepidus* and *P. fragilis*.

X Below the 7" black shale is

11"	3" black calcareous shale crowded
7" grey ls.	with <i>L. limitaris</i> .
7" shaly ls.	
7" blk sh.	
3" blk sh - <i>L. limitaris</i>	

Cliff at Le Roy

The upper inch of the Stafford in contact with the *Spiracutis* is shaly and abounds in *S. subulatum* and a small cup coral.

3" black shale containing



The Stafford appears to be about 33" thick with the Shale lower limestone and the upper heavy layer. The latter varies considerably in thickness.

No shale above the Stafford here lacks the black color of the Mansfield.



July 26.

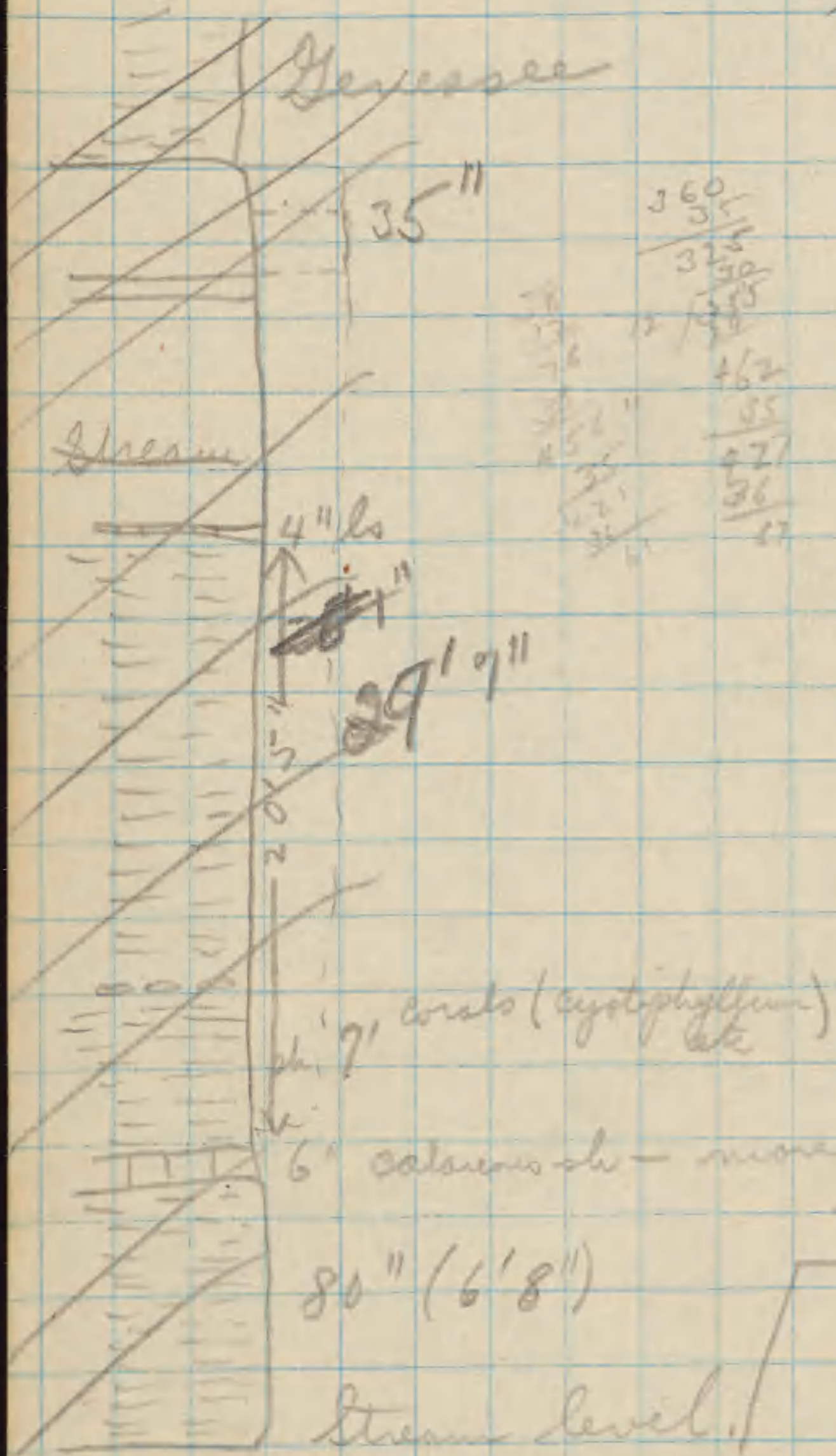
Section on Little Beards Creek - Moscow  
Lecroster

950 paces from the intersection of the "north branch" of Beards Creek with Little Beards Creek Moscow rock is exposed as grey calcareous shales that crumble easily into small fragments. On the opposite side of the river at the same place (950 paces) the shales have a concretionary structure and fall to small pieces or fragments

when exposed to the sun. In this one foot of shale exposed here fossils do not occur abundantly. *C. boethi* and *S. bisulcata* were the only ones seen.

In the shales above this one foot the following fossils were found. Just under the 6" calcareous shale band were found *Pholidops hamiltoniae*, *C. setiger*, *Ambracelias* sp. These shales when weathered have a greenish or olive cast.

*D. concolorum*  
*A. reticularis*,  
small corals,



In the 6" calcareous band are *Ambracelias* sp., *C. setiger*, small corals (*Strophomena*)